

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Box Patent Application

Washington, D. C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) are the specification and claims of the nonprovisional patent application of:

Takanori FUJII and Shigeru KATSURAGI

Inventors

ELECTRONIC MAIL TERMINAL DEVICE AND METHOD OF CONTROLLING THE SAME

Title of Invention

APPLICATION ELEMENTS ENCLOSED:

1. X Specification (total pages 108) including:
 - a. 36 pages of claims (68 claims)
 - b. 1 pages Abstract
2. X 26 sheets of informal X formal drawings (Figs. 1-26)
3. Oath or declaration of Applicant(s) (total pages)
 - a. Newly executed (original or copy)
 - b. Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Item 14 completed)
4. Deletion of Inventor(s)
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)
5. Incorporation By Reference
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied in item 3b is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. Microfiche Computer Program (Appendix)

APPLICATION PARTS ENCLOSED:

7. An assignment of the invention to Ricoh Company, Ltd. (cover sheet & document(s))
8. 37 CFR 3.73(b) Statement (when there is an assignee)
9. Power of Attorney
 - a. Newly executed (original or copy)
 - b. Copy from a prior application

10. Information Disclosure Statement (IDS)/PTO-1449
 Copies of IDS Citations
11. A Preliminary Amendment
12. X Return Receipt Postcard (MPEP 503)
13. A small entity statement under 37 C.F.R. §1.9 and §1.27
 Statement filed in prior application, status still proper and desired
14. If a Continuing Application, *check the appropriate box and supply the requisite information:*
- ☐ Continuation of prior application No.: filed
- ☐ Divisional of prior application No.: filed
- ☐ Continuation-in-part (CIP) of prior application No.: filed
15. Amend the specification by inserting before the first line of page one: --This is a continuation
 divisional of application Serial No. filed .--
16. X Priority of application Nos. 11-194746 and 11-271054 filed in Japan on July 8, 1999 and
September 24, 1999, respectively. Applicants hereby claim priority under 35 U.S.C. § 119.
- X Certified copies of priority application Nos. 11-194746 and 11-271054 will be submitted in
 due course.
- A certified copy of priority application No. has been filed in prior application
 S.N. filed
17. Other (identify)

The filing fee is calculated as follows:

CLAIMS AS FILED, LESS ANY CLAIMS CANCELLED BY AMENDMENT

	Number Filed		Number Extra*		Rate			Fee	
					Small Entity	Other Entity		Small Entity	Other Entity
Total Claims	68-20	=	48	x	\$ 9	\$ 18	=	\$	\$ 864
Indep. Claims	2-3	=	0	x	\$ 39	\$ 78	=	\$	\$ 0
Multiple Dependent Claims Presented: Yes <u> </u> No <u>X</u>					\$130	\$260	=	\$	\$ 0
If the difference in column 1 is less than zero, enter "0" in column 2					Basic Fee			\$ 345	\$ 690
					Total Fee				\$ 1,554

18. X A check in the amount of \$ 1,554.00 to cover the filing fee.
19. Please charge Deposit Account No. 03-3125 in the amount of \$ 40.00 for recordation of the Assignment
20. X The Commissioner is hereby authorized to charge any additional fees which may be required in connection with the following or credit any overpayment to Deposit Account No. 03-3125.
- X Filing fees under 37 C.F.R. § 1.16.
- X Patent application processing fees under 37 C.F.R. §1.17.
- The issue fee set in 37 C.F.R. §1.18 at or before mailing of the Notice of Allowance, pursuant to 37 C.F.R. §1.311(b).
21. X Three copies of this sheet are enclosed.
22. Other (identify) _____

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of : Takanori FUJII et al.

Serial No. : Not Yet Assigned

Group Art Unit:

Date Filed : Concurrently Herewith

Examiner:

For : ELECTRONIC MAIL TERMINAL DEVICE AND METHOD OF
CONTROLLING THE SAME

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New York, N.Y. 10036

Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

EXPRESS MAIL
LETTER OF TRANSMITTAL

Express Mail mailing label number: EM169952423US

Date of Deposit: July 6, 2000

I hereby certify that the above-identified application consisting of a 108-page specification, 68 claims, 26 sheets of formal drawings (Figs. 1-26), 3 copies of transmittal form, and check for \$1,554 filing fee, is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.


Mail Room Employee
Depositing Express Mail Material

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SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT WE, TAKANORI FUJII, a citizen of Japan residing at Kanagawa, Japan and SHIGERU KATSURAGI, a citizen of Japan residing at Kanagawa, Japan have invented certain new and useful improvements in

ELECTRONIC MAIL TERMINAL DEVICE AND METHOD OF
CONTROLLING THE SAME

of which the following is a specification:-

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an electronic mail terminal device that transmits and receives
5 information through electronic mail, and to a method of controlling such a device.

2. Description of the Related Art

In recent years, more and more network facsimile devices that are connected to a local area
10 network or to the Internet and transmit and receive image information through electronic mail have been put into practical use. The ITU-T recommendations have set the T.37 recommendation and the T.38 recommendation as the standards for those Internet facsimile devices.

15 The ITU-T recommendation T. 37 specifies an electronic mail Internet facsimile communication method for exchanging image information through electronic mail via the Internet. The ITU-T recommendation T. 38 specifies a real-time Internet facsimile communication
20 method for exchanging real-time image information via the Internet in accordance with the Group-3 facsimile transmission procedure (the ITU-T recommendation T.30 procedure).

In general, a network facsimile device has a
25 function of exchanging image information via a public

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network, and a function of exchanging image information
via a public network and the Internet through the
electronic mail Internet facsimile communication
function and the real-time Internet facsimile
5 communication function.

A network facsimile device having functions
according to the recommendation T.37 makes an access to
a mail server, in which the device has an account, at
predetermined time intervals so as to fetch electronic
10 mail addressed to the device.

The above network facsimile device also has a
power-saving function of restricting the power
consumption while the device is in a stand-by state.

Japanese Laid-Open Patent Application Nos. 10-
15 91294 and 10-133835 both disclose such a power-saving
function in a terminal device that performs electronic
mail exchange.

In the former reference, however, the mail
server needs to have a function of notifying each client
20 device of electronic mail reception. In the latter
reference, besides a network facsimile device, it is
necessary to employ a printing device to print out
received image information. Because of this, the
technique disclosed in this reference cannot be applied
25 to a case where only a single network facsimile device

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is used.

SUMMARY OF THE INVENTION

It is the principal object of the present
5 invention to provide an electronic mail terminal device
having a power-saving function, and a method of
controlling such an electronic mail terminal device, in
which the above-mentioned problems are eliminated.

To achieve the above object, the present
10 invention provides an electronic mail terminal device
that transmits and receives information through
electronic mail, comprising:

a communication unit that is connected to a
network and performs electronic mail data exchange via
15 the network; and

a power-saving control unit that sets the
communication unit and the device into a power-saving
mode when the device detects that a first power-saving
timing condition is satisfied, and cancels the power-
20 saving mode when the device detects that a second power-
saving timing condition is satisfied.

In the above electronic mail terminal device,
the communication unit is a local area network
communication unit that is connected to a local area
25 network and performs electronic data exchange via the

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local area network,

the first power-saving timing condition is that a stand-by state lasts longer than a predetermined period of time, and

5 the second power-saving timing condition is that an event occurs.

In the above electronic mail terminal device, the power-saving control unit cancels the power-saving mode at predetermined mail fetching
10 intervals so as to fetch electronic mail addressed to the device through the local area network communication unit.

In the above electronic mail terminal device, the power-saving control unit cancels the
15 power-saving mode of the local area network communication unit at the predetermined mail fetching intervals so as to fetch electronic mail addressed to the device through the local area network communication unit,

20 where electronic mail has been fetched, the power-saving control unit canceling the power-saving mode of the device and outputting electronic mail information to the device through the local area network communication unit, and

25 where no electronic mail has been fetched, the

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power-saving control unit not canceling the power-saving mode of the device, and setting the local area network communication unit back into the power-saving mode after a stand-by state lasts longer than the predetermined
5 period of time.

In the above electronic mail terminal device, the mail fetching intervals may be set at will. Also, the mail fetching intervals may have a different value set in each time zone.

10 In another embodiment of the electronic mail terminal device of the present invention,

the communication unit is a dial-up communication unit that makes a dial-up access to an Internet service provide via a public network, and
15 performs electronic mail data exchange via the Internet;

the first power-saving timing condition is that a stand-by state lasts longer than a predetermined period of time; and

the second power-saving timing condition is
20 that an event occurs.

In the above electronic mail terminal device, the power-saving control unit cancels the power-saving mode at predetermined mail fetching intervals so as to fetch electronic mail addressed to the device through
25 the dial-up communication unit.

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5 electronic mail addressed to the device,

10 communication unit, and

15 a stand-by state lasts longer than the predetermined
period of time.

20 in each time zone.

mail, said method comprising the steps of:

25 putting the device and a communication unit.

5 canceling the power-saving mode when the
device detects that a second power-saving timing
condition is satisfied.

the power-saving mode setting step includes

15 period of time; and

Further in the above method,

canceling the power-saving mode at predetermined mail
fetching intervals so as to fetch electronic mail
addressed to the device through the local area network
communication unit.

25 the canceling step includes the step of

5

10

15

may be set in each time zone for the mail fetching intervals.

20

25

performs electronic mail data exchange via the Internet,
into a power-saving mode, when a stand-by state lasts
longer than a predetermined period of time; and

the canceling step includes the step of
5 canceling the power-saving mode when an event occurs.

In the above method, the canceling step
includes the step of canceling the power-saving mode at
predetermined mail fetching intervals so as to fetch
electronic mail addressed to the device through the
10 dial-up communication unit.

Further in the above method, the canceling
step includes the step of

canceling the power-saving mode of the dial-up
communication unit at the predetermined mail fetching
15 intervals so as to fetch electronic mail addressed to
the device. This method further comprises the steps of:

where electronic mail has been fetched,
outputting electronic mail information to the device
through the dial-up communication unit after canceling
20 the power-saving mode of the device; and

where no electronic mail has been fetched,
setting the dial-up communication unit back into the
power-saving mode when a stand-by state lasts longer
than the predetermined period of time, not canceling the
25 power-saving mode of the device.

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In yet another embodiment of the electronic mail terminal device of the present invention,

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation.

Further in the above electronic mail terminal device,

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation, not

where no electronic mail has been fetched, the power-saving control unit prolongs mail fetching intervals by a prescribed arithmetic operation, not canceling the power-saving mode of the device, and sets
5 the dial-up communication unit back into the power-saving mode when a stand-by state lasts longer than the predetermined period of time; and

where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode
10 of the device, outputs electronic mail information to the device through the dial-up communication unit, and then resets the mail fetching intervals to the original predetermined mail fetching intervals.

In yet another embodiment of the electronic
15 mail terminal device of the present invention comprising a local area network communication unit,

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by the prescribed arithmetic operation, and
20 resets the mail fetching interval to the original predetermined mail fetching intervals at a predetermined time.

In the above electronic mail terminal device,
where no electronic mail has been fetched, the
25 power-saving control unit prolongs the mail fetching

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5 than the predetermined period of time;

10 communication unit; and

In still another embodiment of the electronic mail terminal device comprising a dial-up communication unit,

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20  resets the mail fetching intervals to the original
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where no electronic mail has been fetched, the

25 power-saving control unit prolongs the mail fetching

intervals by the prescribed arithmetic operation, not canceling the power-saving mode of the device, and sets the dial-up communication unit back into the power-saving mode when a stand-by state lasts longer than the
5 predetermined period of time;

where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode of the device, and outputs electronic mail information to the device through the dial-up communication unit;
10 and

at the predetermined time, the power-saving control unit resets the mail fetching intervals to the original predetermined mail fetching intervals.

In any applicable one of the above embodiments,
15 the electronic mail terminal device may further includes a semiconductor non-volatile memory that stores the mail fetching intervals. Also, the arithmetic operation may be selected from a plurality of prescribed arithmetic operations by a user.

20 In yet another embodiment of the method of the present invention using a local area network communication unit,

the canceling step includes the step of canceling the power-saving mode of the local area
25 network communication unit at the predetermined mail

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5 prolonging the mail fetching intervals by a prescribed
arithmetic operation.

where electronic mail has been fetched,

10 original predetermined mail fetching intervals.

the canceling step includes the step of

15 fetching intervals so as to fetch electronic mail
addressed to the device through the local area network
communication unit. This method further comprises the
steps of:

the mail fetching intervals by the prescribed

25 predetermined period of time; and

where electronic mail has been fetched,
canceling the power-saving mode of the device,
outputting electronic mail information to the device
through the local area network communication unit, and
5 then resetting the mail fetching intervals to the
original predetermined mail fetching intervals.

In still another embodiment of the method of
the present invention using a dial-up communication unit,

the canceling step includes the step of
10 canceling the power-saving mode of the dial-up
communication unit at the mail fetching intervals so as
to fetch electronic mail addressed to the device through
the dial-up communication unit. This method further
comprises the steps of:

15 where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation; and

where electronic mail has been fetched,
resetting the prolonged mail fetching intervals to the
20 original predetermined mail fetching intervals.

In the above method, the canceling step
includes the step of canceling the power-saving mode of
the dial-up communication unit at the mail fetching
intervals so as to fetch electronic mail addressed to
25 the device through the dial-up communication unit. This

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method further comprises the steps of:

where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation, not canceling the power-saving
5 mode of the device, and then setting the dial-up
communication unit back into the power-saving mode when
a stand-by state lasts longer than the predetermined
period of time; and

where electronic mail has been fetched,
10 canceling the power-saving mode of the device,
outputting electronic mail information to the device
through the dial-up communication unit, and then
resetting the prolonged mail fetching intervals to the
original predetermined mail fetching intervals.

15 In yet another embodiment of the method of the
present invention using a local area network
communication unit,

the canceling step includes the step of
canceling the power-saving mode of the local area
20 network communication unit at the predetermined mail
fetching intervals so as to fetch electronic mail
addressed to the device through the local area network
communication unit. This method further comprises the
steps of:

25 where no electronic mail has been fetched,

prolonging the mail fetching intervals by a prescribed arithmetic operation; and

at a predetermined time, resetting the prolonged mail fetching intervals to the original
5 predetermined mail fetching intervals.

In the above method,

the canceling step includes the step of canceling the power-saving mode of the local area network communication unit at the predetermined mail
10 fetching intervals so as to fetch electronic mail addressed to the device through the local area network communication unit. This method further comprises the steps of:

where no electronic mail has been fetched,
15 prolonging the mail fetching intervals by a prescribed arithmetic operation, not canceling the power-saving mode of the device, and then setting the local area network communication unit back into the power-saving mode when a stand-by state lasts longer than the
20 predetermined period of time;

where electronic mail has been fetched, canceling the power-saving mode of the device, and outputting electronic mail information to the device; and

25 at a predetermined time, resetting the mail

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fetching intervals to the original predetermined mail
fetching intervals.

In still another embodiment of the method of
the present invention using a dial-up communication unit,

5 the canceling step includes the step of
canceling the power-saving mode of the dial-up
communication unit at the mail fetching intervals so as
to fetch electronic mail addressed to the device through
the dial-up communication unit. This method further
10 comprises the steps of:

 where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation; and

 at a predetermined time, resetting the
15 prolonged mail fetching intervals to the original
predetermined mail fetching intervals.

In the above method, the canceling step
includes the step of canceling the power-saving mode of
the dial-up communication unit at the mail fetching
20 intervals so as to fetch electronic mail addressed to
the device through the dial-up communication unit. This
method further comprises the steps of:

 where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
25 arithmetic operation, not canceling the power-saving

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mode of the device, and then setting the dial-up communication unit back into the power-saving mode when a stand-by state lasts longer than the predetermined period of time;

5 where electronic mail has been fetched, canceling the power-saving mode of the device, and outputting electronic mail information to the device through the dial-up communication unit; and

 at a predetermined time, resetting the mail
10 fetching intervals to the original predetermined mail fetching intervals.

 In any applicable one of the above embodiments of the method of the present invention, the mail fetching intervals are stored in a semiconductor non-
15 volatile memory. Also, the arithmetic operation is selected from a plurality of prescribed arithmetic operations by a user.

 In yet another embodiment of the electronic mail terminal device of the present invention,
20 the communication unit is a local area network communication unit that is connected to a local area network and performs electronic mail data exchange via the local area network;

 when a current time is within a predetermined
25 nighttime zone, the power-saving control unit sets the

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when the current time comes out of the predetermined nighttime zone, the power-saving control unit cancels the power-saving mode of the local area network communication unit.

when the current time is within the
predetermined nighttime zone, the power-saving control
unit sets the device into the power-saving mode;

20 when the current time comes out of the
nighttime zone, the power-saving control unit cancels
the power-saving mode of the local area network
communication unit.

In the above electronic mail terminal device,
the power-saving control unit may provided

with a timer for detecting an end of the nighttime zone,
and, based on an output of the timer, cancels the power-
saving mode of the local area network communication unit.

In still another embodiment of the electronic
5 mail terminal device of the present invention,

the communication unit is a dial-up
communication unit that makes a dial-up access to an
Internet service provider via a public network and
performs electronic mail data exchange via the Internet;

10 when a current time is within a predetermined
nighttime zone, the power-saving control unit sets the
dial-up communication unit and the device into the
power-saving mode; and

when the current time comes out of the
15 predetermined nighttime zone, the power-saving control
unit cancels the power-saving mode of the dial-up
communication unit.

The above electronic mail terminal device
further comprises a nighttime power-saving mode setting
20 unit that determined whether or not a power-saving mode
can be set in the predetermined nighttime zone. In this
electronic mail terminal device,

when the current time is within the
predetermined nighttime zone, the power-saving control
25 unit sets the device into the power-saving mode;

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when the nighttime power-saving mode setting unit allows the power-saving mode in the nighttime zone, the power-saving control unit sets the dial-up communication unit into the power-saving mode; and

5 when the current time comes out of the nighttime zone, the power-saving control unit cancels the power-saving mode of the dial-up communication unit.

 In the above electronic mail terminal device, the power-saving control unit may be provided
10 with a timer for detecting an end of the nighttime zone, and, based on an output of the timer, cancels the power-saving mode of the dial-up communication unit.

 In yet another method of the present invention, the power-saving mode setting step includes
15 the step of setting the device and a local area network communication unit, which is connected to a local area network and performs electronic mail data exchange via the local area network, into the power-saving mode, when a current time is within a predetermined nighttime zone;
20 and

 the canceling step includes the step of canceling the power-saving mode of the local area network communication unit when the current time comes out of the predetermined nighttime zone.

25 In the above method,

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the power-saving mode setting step includes the steps of:

when the current time is within the predetermined nighttime zone, setting the device into the power-saving mode; and

when a nighttime power-saving mode setting unit determines that a power-saving mode can be set in the nighttime zone, setting the local area network communication unit into the power-saving mode; and

the canceling step includes the step of,

when the current time comes out of the night time zone, canceling the power-saving mode of the local area network communication unit.

In the above method, the canceling the power-saving mode of the local area network communication unit may be carried out based on an output of a timer that is disposed in the electronic mail terminal device and detects an end of the nighttime zone.

In still another embodiment of the method of the present invention,

the power-saving mode setting step includes the step of setting the device and a dial-up communication unit, which makes a dial-up access to an Internet service provider via a public network and performs electronic mail data exchange via the Internet,

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into the power-saving mode, when a current time is within a predetermined nighttime zone; and

the canceling step includes the step of canceling the power-saving mode of the dial-up

5 communication unit when the current time comes out of the predetermined nighttime zone.

In the above method,

the power-saving mode setting step includes the steps of:

10 when the current time is within the predetermined nighttime zone, setting the device into the power-saving mode; and

when a nighttime power-saving mode setting unit determines that a power-saving mode can be set in
15 the nighttime zone, setting the dial-up communication unit into the power-saving mode; and

the canceling step includes the step of,

when the current time comes out of the night time zone, canceling the power-saving mode of the dial-
20 up communication unit.

In the above method, the canceling the power-saving mode of the dial-up communication unit may be carried out based on an output of a timer that is disposed in the electronic mail terminal device and
25 detects an end of the nighttime zone.

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As described so far, in accordance with the present invention, when electronic mail is neither being fetched nor being transmitted, the local area network communication unit is in a sleep mode. Thus, the power consumption by the local area network unit can be dramatically reduced.

In a case where no electronic mail has been fetched, the electronic mail terminal device is not returned from the power-saving mode, so that unnecessary power consumption can be avoided.

Also in accordance with the present invention, when electronic mail is neither being fetched nor being transmitted, the dial-up communication unit is in a sleep mode. Thus, the power consumption by the dial-up communication unit can be dramatically reduced.

The power-saving mode can be set in the nighttime zone, so that a greater power-saving effect can be achieved.

In a case where no electronic mail has been fetched in the nighttime zone, the mail fetching intervals are prolonged. Accordingly, unnecessary power consumption can be effectively restricted, and a greater power-saving effect can be achieved.

Other objects and further features of the present invention will become more apparent from the

following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

5 FIG. 1 is a block diagram of the structure of a network system in accordance with a first embodiment of the present invention;

 FIG. 2 is a block diagram of an example structure of a network facsimile device FX;

10 FIG. 3 is a block diagram of an example structure of a facsimile unit FU in the network facsimile device FX of FIG. 2;

 FIG. 4 is a block diagram of an example structure of a local area network unit LU in the network facsimile device FX of FIG. 2;

 FIG. 5 shows example mail fetching intervals;

 FIG. 6 is a flowchart of an example process performed by a system control unit of the facsimile unit FU when the system control unit is activated;

20 FIG. 7 is a flowchart of an example process performed by the power-saving control unit of the facsimile unit FU;

 FIG. 8 is a flowchart of an example process performed by the local area network unit LU when the local area network unit LU is activated by the facsimile

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unit FU;

FIG. 9 is a flowchart of an example process performed by the local area network unit LU when the local area network unit LU is activated by a timer;

5 FIG. 10 is a block diagram of a network system in accordance with another embodiment of the present invention;

10 FIG. 11 is a block diagram of an example structure of a network facsimile device FXa shown in FIG. 10;

FIG. 12 is a block diagram of an example structure of a dial-up unit DU shown in FIG. 11;

15 FIG. 13 is a flowchart of an example process performed by the dial-up unit DU when the dial-up unit DU is activated by the facsimile unit FU;

FIG. 14 is a flowchart of an example process performed by the dial-up unit DU when the dial-up unit DU is activated by a timer;

20 FIG. 15 is a flowchart of another example process performed by the system control unit when the system control unit is activated;

FIG. 16 is a flowchart of an example call receiving process in step 714 in the flowchart of FIG. 15;

25 FIG. 17 is a flowchart of an example process

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performed by the local area network unit LU when the timer activates the local area network unit LU;

FIG. 18 is a flowchart of an example process performed by the CPU of the local area network unit LU
5 in the nighttime power-saving mode;

FIG. 19 is a flowchart of another example process performed by the dial-up unit DU when the timer activates the dial-up unit;

FIG. 20 shows an another example of mail
10 fetching intervals;

FIG. 21 is a block diagram of a modified structure of the local area network unit LU;

FIG. 22 is a flowchart of another example process performed by the local area network unit LU when
15 the timer activates the local area network unit LU;

FIG. 23 is a flowchart continued from the flowchart of FIG. 22;

FIG. 24 is a block diagram of a modified structure of the dial-up unit DU;

20 FIG. 25 is a flowchart of another example process performed by the dial-up unit DU when the timer activates the dial-up unit DU; and

FIG. 26 is a flowchart continued from the flowchart of FIG. 25.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following is a description of embodiments of the present invention, with reference to the accompanying drawings.

5 FIG. 1 is a block diagram of a network system in accordance with a first embodiment of the present invention. In this figure, workstations WS1 to WSn, a mail server SM, and a network facsimile device FX are connected to a local area network LAN. The local area
10 network LAN is connected to the Internet via a router RT, so that the workstations WS1 to WSn, the mail server SM, and the network facsimile device FX can exchange various kinds of data with host terminals connected to other local area networks.

15 The mail server SM provides services such as electronic mail collection and distribution for users of the workstations WS1 to WSn and the network facsimile machine that are connected to the local area network LAN.

20 The workstations WS1 to WSn are provided with various programs such as application software for exchanging data via the local area network LAN and for processing image data contained in electronic mail received through the network facsimile device FX. The workstations WS1 to WSn are used by one or more
25 authorized users.

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As a protocol used by each terminal for confirming electronic mail reception and requesting electronic mail transmission, the so-called POP (Post Office Protocol) can be employed.

5 The communication protocols such as the TCP/IP, SMTP, and POP, and the electronic mail data formats and data structures, are specified in the RFC (Request For Comments) issued by the IETF (Internet Engineering Task Force), which is an organization for summarizing
10 Internet technologies. For instance, the TCP is defined in the RFC 793, the IP in the RFC 793, the SMTP in the RFC 821, the electronic mail formats in the RFC 822, the RFC 1521, and the RFC 1522 (the MIME (Multi-Purpose Mail Extension) format), and the protocol for exchanging
15 facsimile image data through the electronic mail in the RFC 2305.

FIG. 2 shows an example structure of the network facsimile device FX. The network facsimile device FX comprises a facsimile unit FU having a
20 facsimile transmission function and a local area network unit LU connected to the local area network LAN so as to transmit and receive electronic mail via the local area network LAN.

The facsimile unit FU outputs a power source
25 (stand-by power source) PA1 and an activating command

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signal SWk for activating the local area network unit LU
in a power-saving mode, to the local area network unit
LU. The local area network unit LU outputs a return
command signal SSt for activating the facsimile unit FU
5 in a power-saving mode, to the facsimile unit FU.

The facsimile unit FU and the local area
network unit LU are connected to each other by a control
bus BB, so that various kinds of data can be exchanged
between the facsimile unit FU and the local area network
10 unit LU.

FIG. 3 shows an example structure of the
facsimile unit FU. In this facsimile unit FU, a system
control unit 1 performs various control processes such
as a facsimile transmission control protocol. A system
15 memory 2 stores various kinds of data required by the
system control unit 1 for performing control programs,
and also serves as a work area for the system control
unit 1. A parameter memory 3 stores various kinds of
information inherent to the facsimile unit FU. A clock
20 circuit 4 outputs current time information. A scanner 5
reads an original image at predetermined resolution. A
plotter 6 records and outputs an image at predetermined
resolution. An operation display unit 7 is used to
operate the network facsimile device FX, and comprises
25 various operation keys and displays. An encoding and

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decoding unit 8 encodes and compresses an image signal,
and decodes the encoded and compresses image information
into the original image data. An image accumulating
device 9 stores a large amount of encoded and compresses
5 image information. A Group-3 facsimile modem 10 serves
as a modem for a Group-3 facsimile machine, and has a
low-speed modem function (V.21 modem) for exchanging
transmission protocol signals and a high-speed modem
function (V.17 modem, V.34 modem, V.29 modem or V.27-ter.
10 modem) mainly for exchanging image information. A
network control unit 11 connects the network facsimile
device FX to a public switched telephone network PSTN,
and has automatic calling and receiving functions.

The system control unit 1, the system memory 2,
15 the parameter memory 3, the clock circuit 4, the scanner
5, the plotter 6, the operation display unit 7, the
encoding and decoding unit 8, the image accumulating
device 9, the Group-3 facsimile modem 10, and the
network control unit 11, are all connected to an
20 internal bus 12. Data exchange among those components
is generally carried out via the internal bus 12.

The data exchange between the network control
unit 11 and the Group-3 facsimile modem 10 is directly
carried out.

25 A power-saving control unit 13 reduces the

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power consumption during a stand-by operation. More specifically, the power-saving control unit 13 turns power sources outputted from a power supply unit 14 into the stand-by power source PA1 and a main power source PA2, and then supplies the power sources PA1 and PA2 to each of the components of the facsimile unit FU. The stand-by power source PA1 is also supplied to the local area network unit LU.

The power-saving control unit 13 also exchanges the activating command signal SWk and the return command signal SSt with the local area network unit LU.

Also in the facsimile unit FU, events for detecting a switch from a power-saving mode to a normal operation mode include an activating command input from the operation display unit 7, read document setting to the scanner 5, detection of a call from the analog public switched telephone network PSTN. In order to detect those events, the stand-by power source PA1 is constantly supplied to the operation display unit 7, the scanner 5, a document detecting unit (not shown), and the network control unit 11, while only the main power source PA2 is supplied to the remaining components.

A signal SC1 for instructing to move into the power-saving mode is outputted from the system control

unit 1 to the power-saving control unit 13. A signal SC2 for instructing to return from the power-saving mode and notifying of a power-saving mode canceling factor is outputted from the power-saving control unit 13 to the system control unit 1.

A signal ST1 for notifying that a read document has been set is outputted from the scanner 5 to the power-saving control unit 13. A signal ST2 for notifying that an activating instruction has been inputted is outputted from the operation display unit 7 to the power-saving control unit 13. A signal ST3 for notifying that a call from the analog public switched telephone network PSTN has been detected is outputted from the network control unit 11 to the power-saving control unit 13.

FIG. 4 shows an example structure of the local area network unit LU. In this local area network unit LU shown in FIG. 4, a CPU (Central Processing Unit) 21 has a clock function, and controls the operation of the local area network unit LU. A ROM (Read-Only Memory) 22 stores a control program and the like to be executed by the CPU 21. A RAM (Random-Access Memory) 23 serves as a work area of the CPU 21. A timer 24 measures a time set by the CPU 21, and when completing the time measuring, notifies the CPU 21 that the time has run out.

5 A shared memory 25 is connected to the control bus BB, and carries out transmission data exchange and control data exchange between the system control unit 1 of the facsimile unit FU and the CPU 21 of the local area network unit LU.

10 A local area network transmission control unit 26 performs communication control processes (such as electronic mail transmission and reception processes) so as to exchange various kinds of data with other data terminal devices via the local area network LAN. A local area network interface circuit 27 connects the network facsimile device FX to the local area network LAN.

15 The CPU 21, the ROM 22, the RAM 23, the timer 24, the shared memory 25, and the local area network transmission control unit 26, are all connected to an internal bus 28, so that data exchange among those components is carried out via the internal bus 28.

20 In this embodiment, the network facsimile device FX is connected to the mail server SM at predetermined intervals so as to fetch electronic mail addressed to the network facsimile device FX. While being connected to the mail server SM, the network facsimile device FX inquires whether or not any
25 electronic mail addressed to the network facsimile

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device FX itself is stored. If electronic mail addressed to the network facsimile device FX is stored, the network facsimile device FX fetches the stored electronic mail.

5 The mail fetching intervals are determined by the operation status of an area in which the network facsimile device FX is disposed. FIG. 5 shows example mail fetching intervals.

10 In FIG. 5, electronic mail is fetched every 3 minutes from 9 a.m. to 6 p.m., every 30 minutes from 6 p.m. to 8 p.m. The mail fetching intervals are set at 0 from 8 p.m. to 9 a.m. next day, during which no mail fetching is carried out. A user can set the mail fetching intervals at will in each time zone.

15 The setting information of the mail fetching intervals is registered in the local area network unit LU, and, based on the set mail fetching intervals, the local area network unit LU automatically fetches electronic mail.

20 In network facsimile device having the above structure, if a power-saving key (not shown) disposed on the operation display unit 7 is pressed or a stand-by state has lasted longer than a predetermined period of time, the system control unit 1 outputs the signal SC1
25 to the power-saving control unit 13 to instruct the

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local area network unit LU to move into the power-saving mode. At this point, the power-saving control unit 13 stops the supply of the main power source PA2 and outputs only the stand-by power source PA1, so that the network facsimile device FX moves into the power-saving mode.

When neither fetching nor transmitting electronic mail, the local area network unit LU sets the local area network transmission control unit 26 and the local area network interface circuit 27 into a sleep mode, so as to reduce the power consumption by the local area network transmission control unit 26 and the local area network interface circuit 27.

The electronic mail fetching operation is performed in the power-saving mode. If electronic mail is received in the power-saving mode, the CPU 21 outputs the return command signal SSt to the power-saving control unit 13. This input of the return command signal SSt is handled as a power-saving mode canceling event in the power-saving control unit 13.

Meanwhile, if the various events mentioned before occur in the power-saving mode, the power-saving control unit 13 switches on the main power source PA2, and outputs the signal SC2 to notify the system control unit 1 of the power-saving mode canceling factor. By

doing so, the system control unit 1 is activated.

Having received the signal SC2, the system control unit 1 determines that the power-saving mode has been canceled, and analyzes the power-saving mode canceling factor. Based on the analysis, the system control unit 1 performs a suitable operation.

Since the local area network transmission control unit 26 and the local area network interface circuit 27 are in the sleep mode when the local area network unit LU is neither fetching nor transmitting electronic mail, the power consumption by the local area network unit LU can be dramatically reduced in this embodiment.

FIG. 6 shows an example process performed by the system control unit 1 when the system control unit 1 is activated.

First, the activating factor is analyzed in step 101. If the signal SC2 has already been received, it is determined that the power-saving mode has been canceled ("YES" in step 102). The system control unit 1 performs a process corresponding to the power-saving mode canceling factor notified by the signal SC2 in step 104. If the power-saving mode canceling factor is electronic mail reception, for instance, the system control unit 1 receives image information contained in

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the received electronic mail from the local area network unit LU, and records and outputs the received image information through the plotter 6.

Next, the system control unit 1 monitors whether or not the power-saving key (not shown) on the operation display unit 7 is pressed, or whether or not the stand-by state has lasted longer than a predetermined period of time, in step 105. If the result of step 105 is "YES", the system control unit 1 notifies the local area network unit LU that the facsimile unit FU is to move into the power-saving mode in step 106. The system control unit 1 then outputs the signal SC1 to the power-saving control unit 13 in step 107. Thus, the facsimile unit FU moves into the power-saving mode.

Meanwhile, if the activating factor is not canceling the power-saving mode, i.e., the result of step 102 is "NO", the system control unit 1 performs processes in the normal operation mode in step 103.

FIG. 7 shows an example process performed by the power-saving control unit 13.

First, the stand-by power source PA1 and the main power source PA2 are switched on in step 201, and the power-saving control unit 13 awaits an input of a power-saving instruction from the system control unit 1

("NO" in step 202). When a power-saving instruction is inputted from the system control unit 1 ("YES" in step 202), the power-saving control unit 13 switches off the main power source PA2, and moves into the power-saving mode instep 203.

The power-saving control unit 13 then monitors whether or not a canceling event occurs ("NO" in step 204). When a canceling event occurs ("YES" in step 204), the power-saving control unit 13 switches on the main power source PA2 in step 205, and notifies the system control unit 1 of the power-saving canceling factor by the signal SC2 in step 206. The operation of the power-saving control unit 13 then returns to step 202.

FIG. 8 is a flowchart of an example process performed by the local area network unit LU when the facsimile unit FU activates the local area network unit LU. This activation is carried out when the facsimile unit FU transmits electronic mail.

First, the CPU 21 performs a predetermined activating process in step 301, and then activates the entire local area network unit LU in step 302. The CPU 21 fetches electronic mail transmitted from the facsimile unit FU in step 303, and transmits the electronic mail to the mail server SM in step 304.

The current time is read in step 305, and a

mail fetching interval corresponding to the current time is inputted in step 306. The inputted time data is set to the timer 24 in step 307. The local area network transmission control unit 26 and the local area network interface circuit 27 are set into a sleep mode in step 308. The CPU21 then sets itself into the sleep mode in step 309. Here, this operation of the local area network unit comes to an end.

FIG. 9 is a flowchart of an example process performed by the local area network unit LU when the timer 24 activates the local area network unit LU.

First, the local area network unit LU communicates with the mail server SM, and inquires whether or not any electronic mail addressed to the network facsimile device FX is stored in step 401. If there is some electronic mail addressed to the network facsimile device FX ("YES" in step 402), it is determined whether or not the facsimile unit FU is in the power-saving mode in step 403.

If the result of step 403 is "YES", the CPU 21 outputs the return command signal SSt in step 404, electronic mail is fetched from the mail server SM and stored in step 405. The local area network unit LU then waits for the facsimile unit FU to return from the power-saving mode in step 406.

When the facsimile unit FU returns from the power-saving mode ("YES" in step 406), the contents of the stored electronic mail are transmitted to the facsimile unit FU in step 407.

5 The current time is read in step 408, and a mail fetching interval corresponding to the current time is inputted in step 409. The inputted time data is set to the timer in step 410. The local area network transmission control unit 26 and the local area network
10 interface circuit 27 are put into the sleep mode in step 411. The CPU 21 also sets itself in the sleep mode in step 412, and this operation of the local area network unit LU comes to an end.

 Meanwhile, if the result of step 402 is "NO",
15 or the result of step 403 is "NO", the operation skips to step 408, and the steps that follow are carried out.

 In this embodiment, the network facsimile device FX is connected to the local area network LAN, and electronic mail exchange is carried out via the
20 local area network LAN. However, it is also possible for a network facsimile device to carry out the electronic mail exchange through the Internet by dial-up access.

 In such a case, a network facsimile device FXa
25 makes a dial-up access to an Internet service provider

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ISP via an analog public switched telephone network PSTN,
so that the network facsimile device FXa is connected to
the Internet ITNET via the Internet service provider ISP,
as shown in FIG. 10. In this system, electronic mail
5 exchange is carried out between the network facsimile
device FXa and the mail server SM on the Internet ITNET.

Further, it is also possible to utilize a mail
server installed in the Internet service provider ISP.
In this case, the Internet service provider ISP itself
10 constitutes a part of the Internet INET, thereby making
this structure equivalent to the structure shown in FIG.
10.

FIG. 11 shows an example structure of the
network facsimile device FXa.

15 This network facsimile device FXa comprises a
facsimile unit FU having a facsimile machine function,
and a dial-up unit DU that makes a dial-up access to the
Internet service provider ISP via the analog public
switched telephone network PSTN and performs
20 communication processes on the Internet INET.

A power source (stand-by power source) PA1 and
an activating command signal SWk for activating the
dial-up unit DU in the power-saving mode are outputted
from the facsimile unit FU to the dial-up unit DU. A
25 return command signal SSst for activating the facsimile

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unit FU in the power-saving mode is outputted from the dial-up unit DU to the facsimile unit FU.

The facsimile unit FU and the dial-up unit are connected to each other via a control bus BB, so that
5 data exchange between the facsimile unit FU and the dial-up unit DU is carried out via the control bus BB.

FIG. 12 shows an example structure of the dial-up unit DU.

In FIG. 12, a CPU (Central Processing Unit) 31
10 has a clock function and control the operation of the dial-up unit DU. A ROM (Read-Only Memory) 32 stores control programs to be executed by the CPU 31. A RAM (Random-Access Memory) 33 serves as a work area for the CPU 31. A timer 34 measure a time set by the CPU 31,
15 and when completing the time measuring, outputs a signal to notify the CPU 21 that the time has run out.

A shared memory 35 is connected to the control bus BB, and is used for exchanging various kinds of data (including transmission data and control data) between
20 the system control unit 1 of the facsimile unit FU and the CPU 31 of the dial-up unit DU.

A data modem 36 is provided with a predetermined data modem function and is used for exchanging data with the Internet service provider ISP.
25 A network control unit 37 is used for connecting the

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data modem 36 to a public network. Also, the network control unit 33 is used for making a dial-up access to the Internet service provider ISP, and therefore has only an automatic calling function.

5 An Internet transmission control unit 38 carries out communication control processes for exchanging various kinds of data between servers on the Internet and other data terminal devices via the data modem 36.

10 The CPU 31, the ROM 32, the RAM 33, the timer 34, the shared memory 35, the data modem 36, the network control unit 37, and the Internet transmission control unit 38, are all connected to an internal bus 39, so that data exchange among those components is carried out
15 via the internal bus 39.

 The operations of the network facsimile device FXa of this embodiment are substantially the same as the operations of the network facsimile device FX, except that the network facsimile device FXa makes a dial-up
20 access and terminates a connection.

 FIG. 13 is a flowchart of an example process performed by the dial-up unit DU when the facsimile unit FU activates dial-up unit DU. This activation is carried out when the facsimile unit FU transmits
25 electronic mail.

First, the CPU 31 performs a predetermined activating process in step 501, and activates the entire dial-up unit DU in step 502. The CPU 31 then calls out the Internet service provider ISP, and makes a dial-up access to the Internet INET in step 503. Electronic mail transmitted from the facsimile unit FU is fetched in step 504, and the electronic mail is transmitted to the mail server SMa in step 505. The dial-up connection to the Internet INET is then terminated in step 506.

THE current time is read in process 507, and a mail fetching interval corresponding to the current time is inputted in step 508. The inputted time data is set to the timer 34 in step 509. The data modem 36, the network control unit 37, and the Internet transmission control unit 38 are put into the sleep mode in step 510. The CPU 31 then sets itself into the sleep mode in step 511, and this operation comes to an end.

FIG. 14 is a flowchart of an example process performed by the dial-up unit DU when the timer 34 activates the dial-up unit DU.

First, the dial-up unit DU calls the Internet service provider ISP, and makes a dial-up access to the Internet INET in step 601. The dial-up unit DU is thus connected to the mail server SMa, and inquires whether or not any electronic mail addressed to the network

5 in step 604.

10 dial-up connection to the Internet INET in step 607, and
waits for the facsimile unit FU to return from the
power-saving mode in step 608.

15 the stored electronic mail are transmitted to the
facsimile unit FU in step 609.

20 to the timer 34 in step 612. The data modem 36, the
network control unit 37, and the Internet transmission
control unit 38 are put into the sleep mode in step 613.
The CPU 31 then sets itself into the sleep mode in step
614. Here, this operation of the dial-up unit DU comes
25 to an end.

Meanwhile, if the result of step 603 is "NO" or the result of step 604 is "NO", the operation skips to step 610, and the steps that follow are carried out.

As described so far, the data modem 36, the network device 37, and the Internet transmission control unit 38 are in the sleep mode, when electronic mail is neither fetched nor transmitted. Thus, the power consumption by the dial-up unit DU can be dramatically reduced in this embodiment.

A normal facsimile device is in the power-saving mode in a predetermined nighttime zone (from 8 p.m. to 8 a.m. next day). If the facsimile device receives a call in the nighttime zone, a normal receiving operation is performed, and received image information is accumulated. When accumulated image information is found after the nighttime zone, it is possible to record and output the received original of the accumulated image information in a nighttime power-saving mode.

In a case where the network facsimile device FX shown in FIG. 2 is put into the nighttime power-saving mode, the system control unit 1 performs a predetermined process when activated. FIG. 15 is a flowchart of the predetermined process performed by the system control unit 1. Here, the facsimile unit FU and

the local area network unit LU can be put into the nighttime power-saving mode independently of each other.

First, the activating factor is analyzed in step 701. If the signal SC2 has already been received, it is determined that the power-saving mode has been canceled ("YES" in step 702). The system control unit 1 performs a process corresponding to the power-saving mode canceling factor notified by the signal SC2 in step 703. If the power-saving mode canceling factor is electronic mail reception, for instance, the system control unit 1 receives image information contained in the received electronic mail from the local area network unit LU, and records and outputs the received image information through the plotter 6.

Meanwhile, if the power-saving mode canceling factor is not electronic mail reception ("NO" in step 702), an initializing process in the normal operation mode is carried out in step 704.

It is determined whether or not the nighttime power-saving mode is set in step 705. If the result of step 705 is "YES", the system control unit 1 notifies the local area network unit LU of the nighttime zone information and the setting of the nighttime power-saving mode in step 706. If the result of step 705 is "NO", step 706 is not carried out.

Next, the system control unit 1 monitors whether or not a power-saving key (not shown) provided on the operation display unit 7 is pressed, whether or not the stand-by state has lasted longer than a
5 predetermined period of time, whether or not a transmission is carried out, whether or not a call reception is detected, and whether or not some other process is carried out in steps 707, 708, 709, and 710.

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10 If the power-saving key (not shown) provided on the operation display unit 7 is pressed or the stand-by state has lasted longer than a predetermined period of time ("YES" in step 707), the system control unit 1 notifies the local area network unit LU that the facsimile unit FU is to move into the power-saving mode
15 in step 711. The system control unit 1 outputs the signal SC1 to the power-saving control unit 13 in step 712, so that the facsimile unit FU moves into the power-saving mode.

If a transmission is carried out ("YES" in
20 step 708), a predetermined transmitting process is performed in step 713, and the operation returns to step 707. If a call reception is detected ("YES" in step 709), a predetermined call receiving process is performed in step 714, and the operation returns to step
25 707. If some other process is carried out, a

corresponding process is performed in step 715, and the operation returns to step 707.

FIG. 16 is a flowchart of an example process of the call receiving process (step 714).

5 First, it is determined whether or not the nighttime power-saving mode has been set in step 801. If it is determined that the nighttime power-saving mode has been set ("YES" in step 801), the current time is obtained from the clock circuit 4 in step 802. It is
10 determined that the obtained current time is within the set nighttime zone in step 803.

If the current time is within the set nighttime zone ("YES" in step 803), a response is made to the call in step 804. A predetermined pre-
15 transmission procedure is performed and a transmission function used for transmission the image information is determined in step 805. A modem training procedure is then performed in step 806. A modem speed used in the modem training procedure is determined, and the image
20 information is received from a communicating terminal by a predetermined image information receiving process, and the received image information is stored in the image accumulating device 9 in step 807.

When the image information reception is
25 finished, a predetermined post-transmission procedure is

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performed in step 808, and the line is reset in step 809.
In this manner, the reception operation in the nighttime
power-saving mode is completed.

Meanwhile, if it is determined that the
5 nighttime power-saving has not been set ("NO" in step
801), or if the current time is not within the set
nighttime zone ("NO" in step 803), a predetermined pre-
transmission procedure is performed, and a transmission
function used for transmitting the image information in
10 step 811. A predetermined modem training procedure is
performed in step 812, and the modem speed used in this
procedure is determined. The image information is then
received from the communicating terminal by a
predetermined image information receiving procedure, and
15 the received image information is decoded into the
original image data by the encoding and decoding unit 8.
The image data is transferred to the plotter 6, and the
received original is recorded and outputted in step 813.

After the image information reception is
20 completed, a predetermined post-transmission procedure
is performed in step 814. The line is then reset in
step 815, and the reception operation comes to an end.

It is determined whether or not received image
information files which have not been recorded and
25 outputted is accumulated in the image accumulating

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device 9 in step 816. If the result of step 816 is
"YES", one of the received image information files is
selected in step 817. The selected received image
information file is read out from the image accumulating
5 device 9, and the image information is decoded into the
original image data by the encoding and decoding unit 8.
The image data is transferred to the plotter 6, and the
received original is recorded and outputted in step 818.

The recorded image information file is erased
10 from the image accumulating device 9 in step 819, and
the operation returns to step 816.

If the result of step 816 is "NO" when all the
received image information files accumulated in the
image accumulating device 9 are recorded and outputted,
15 the operation comes to an end.

FIG. 17 is a flowchart of an example process
performed by the local area network unit LU when the
timer 24 activates the local area network unit LU.

First, the local area network unit LU makes an
20 access to the mail server SM, and inquires whether or
not any electronic mail addressed to the network
facsimile device FX is stored in step 901. If there is
some electronic mail addressed to the network facsimile
device FX ("YES" in step 902), it is determined whether
25 or not the facsimile unit FU is in the power-saving mode

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in step 903.

If the result of step 903 is "YES", the CPU 21
outputs the return command signal SSt in step 904. The
electronic mail is fetched from the mail server SM, and
5 then stored in step 905. The CPU 21 waits for the
facsimile unit FU to return from the power-saving mode.

When the facsimile unit FU returns from the
power-saving mode ("YES" in step 906), the contents of
the stored electronic mail are transmitted to the
10 facsimile unit FU in step 907.

Next, the current time is read in step 908,
and a mail fetching interval corresponding to the
current time is inputted in step 909. The inputted time
data is set to the timer 24 in step 910. THE local area
15 network transmission control unit 26 and the local area
network interface circuit 27 are then put into the sleep
mode in step 911. The CPU 21 also sets itself into the
sleep mode in step 912, and this operation of the local
area network unit LU comes to an end.

20 Meanwhile, if the result of step 902 is "NO",
the operation skips to step 908, and the steps that
follow are carried out. Accordingly, if there is no
received electronic mail, the facsimile unit FU is not
activated, thereby avoiding unnecessary power
25 consumption.

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If it is determined that the facsimile unit FU is not in the power-saving mode ("NO" in step 903), electronic mail is fetched from the mail server SM and then stored in step 913, and the contents of the stored electronic mail are transmitted to the facsimile unit FU in step 914. The operation then skips to step 908, and the steps that follow are carried out.

FIG. 18 is a flowchart of an example process in the nighttime power-saving mode performed by the CPU 21 of the local area network unit LU after the facsimile unit FU transmits the nighttime zone information and the notification that the nighttime power-saving mode has been set.

First, the nighttime zone information is stored in step 1001, and it is determined whether or not the nighttime power-saving mode can be set in step 1002.

If it is determined that the nighttime power-saving mode can be set ("YES" in step 1002), the CPU 21 waits until the start time of the nighttime zone ("NO" in step 1003). When the starting time of the nighttime zone has come ("YES" in step 1003), the remaining time in the nighttime zone is calculated in step 1004, and the obtained time value is set to the timer 24 in step 1005. The local area network transmission control unit 26 and the local area network interface circuit 27 are

then put into the sleep mode in step 1006. The CPU 21 also sets itself into the sleep mode in step 1007, and this operation of the CPU 21 comes to an end.

FIG. 19 is a flowchart of another example process performed by the dial-up unit DU when the timer 34 activates the dial-up unit DU.

First, the dial-up unit DU calls h Internet service provider ISP, and makes a dial-up access to the Internet INET in step 1100. The dial-up unit DU then communicates with the mail server SMa, and inquires whether or not any electronic mail addressed to the network facsimile device FXa is stored in step 1101. If there is some electronic mail addressed to the network facsimile device FXa ("YES" in step 1102), it is determined whether or not the facsimile nit FU is in the power-saving mode in step 1103.

If the result of stop 1103 is "YES", the dial-up unit DU outputs the return command signal SSt in step 1104. Electronic mail is fetched from the mail server SMa and then stored in step 1105. The dial-up connection to the Internet INET is then terminated, and the dial-up unit DU waits for the facsimile unit FU to return from the power-saving mode ("NO" in step 1106).

When the facsimile unit FU returns from the power-saving mode ("YES" in step 1106), the contents of

The current time is then read in step 1108, and a mail fetching interval corresponding to the

current time is inputted in step 1109. The inputted time data is set to the timer 34 in step 1110. The data modem 36, the network control unit 37, and the Internet transmission control unit 38 are then put into the sleep mode in step 1111. The CPU 31 also sets itself into the sleep mode in step 1112, and this operation then comes to an end.

Meanwhile, the result of step 1102 is "NO", the operation skips to step 1108, and the steps that follow are carried out. If there is no received electronic mail, the facsimile unit FU is not activated, thereby avoiding unnecessary power consumption.

If it is determined that the facsimile unit FU is not in the power-saving mode ("NO" in step 1103), electronic mail is fetched from the mail server SMa and then stored in step 1113. The contents of the stored electronic mail are transmitted to the facsimile unit FU in step 1114. After that, the operation skips to step 1108, and the steps that follow are then carried out.

In the above embodiment, the mail fetching intervals are fixed in the manner shown in FIG. 5. In

FIG. 5, electronic mail fetching is not carried out in the time zone corresponding to the nighttime zone.

However, there might be a request to fetch electronic mail in the nighttime zone. In such a case, electronic
5 mail fetching can be carried out at intervals in the nighttime zone.

However, if electronic mail fetching is carried out in the nighttime zone, the mail fetching process needs to be repeated while electronic mail is
10 not often received. This results in unnecessary power consumption.

To avoid such a situation, the mail fetching intervals can be prolonged to reduce unnecessary power consumption. Accordingly, a power-saving effect can be
15 expected. In this case, the mail fetching intervals are gradually prolonged. Therefore, the upper limit should be set for the mail fetching intervals. Also, the prolonged mail fetching intervals should be reset to the original mail fetching intervals at the end of the
20 nighttime zone.

FIG. 20 shows example mail fetching intervals. In this example, an on-time flag is set in each time zone. This on-time flag is used for distinguishing the nighttime zone from the normal operation time zone.

25 In the power-saving mode, the entire device is

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in the sleep mode, and it is necessary to store the current mail fetching intervals for calculating the next mail fetching intervals. Therefore, a modification is made to the structure of the local area network unit LU in the network facsimile device FX of FIG. 2. FIG. 21 shows the modified structure of the local area network unit LU. In FIG. 21, the same components as in FIG. 4 are denoted by the same reference numerals.

In this modification, the RAM 23 used as a work area of the CPU 21 is replaced by a non-volatile memory 23a, which is also used as a work area of the CPU 21.

FIGS. 22 and 23 are a flowchart of an example process performed by the local area network unit LU when the timer 24 activates the local area network unit LU.

First, the local area network unit LU makes an access to the mail server SM to inquire whether or not any electronic mail addressed to the network facsimile device FX is stored in step 1201. If there is electronic mail addressed to the network facsimile device FX ("YES" in step 1202), an increment flag for specifying the operation mode for prolonging the mail fetching intervals is cleared in step 1203. Next, it is checked whether or not the facsimile unit FU is in the power-saving mode in step 1204.

If the result of step 1204 is "YES", the CPU 21 outputs the return command signal SSt in step 1205, and fetches electronic mail from the mail sever SM in step 1206. The local area network unit LU then waits until the facsimile unit FU returns from the power-saving mode ("NO" in step 1207).

When the facsimile unit FU returns from the power-saving mode ("YES" in step 1207), the contents of the store electronic mail are transmitted to the facsimile unit in step 1208.

Next, the current time is read in step 1209, and a mail fetching interval corresponding to the current time is inputted in step 1210. The inputted time data are set to the timer 24 in step 1211. The local area network transmission control unit 26 and the local area network interface circuit 27 are then set into the sleep mode in step 1212. The CPU 21 also sets itself into the sleep mode in step 1213, and the operation then comes to an end.

Meanwhile, if the facsimile unit FU is not in the power-saving mode ("NO" in step 1204), electronic mail is fetched from the mail server SM and stored in step 1214. The contents of the stored electronic mail are transmitted to the facsimile unit FU in step 1215. The operation then skips to step 1209, and the steps

If the result of step 1202 is "NO", it is checked whether or not the increment flag is "ON" in step 1216. If the result of step 1216 is "NO", the next mail fetching intervals are set at a predetermined value (see FIG. 20). More specifically, the current time is read in step 1217, and the mail fetching interval corresponding to the current time is fetched in step 1218. The time data is then stored in step 1219.

The time data stored in step 1219 is then set to the timer 24 in step 1222. The operation moves on to step 1212, and the steps that follow are carried out.

20 If the increment flag is "ON" (the result of
step 1216 is "YES"), the stored time data is read in
step 1223, and it is determined which calculation mode
is designated by the user in step 1224. Examples of the
calculation mode includes: $N(n+1) = N(n) + KA$ (calculation
25 mode 1; KA is a constant value); $N(n+1) = N(n) + 2KA$

(calculation mode 2; KA is a constant); and $N(n+1) = N(n)$ (calculation mode 3; not to be prolonged). A user can select one of the calculation modes through a predetermined mode setting process.

5 Using the selected calculation mode, a mail fetching interval until the next mail fetching is calculated, and the mail fetching interval value is updated in step 1225. It is checked whether or not the updated mail fetching interval value exceeds the upper
10 limit (120 minutes, for instance) in step 1226. If the updated mail fetching interval value exceeds the upper limit ("YES" in step 1226), the updated mail fetching interval value is reset at the upper limit value in step 1227.

15 Next, the current time is read in step 1228, and it is checked whether or not the on-time flag in the current time zone is "ON" in step 1229. If the on-time flag is "ON" ("YES" in step 1229), the mail fetching interval value corresponding to the current time is
20 fetched in step 1230, because the mail fetching intervals cannot be prolonged in the current time zone. The mail fetching intervals are reset at the fetched mail fetching interval value in step 1231. Also, the increment flag is cleared in step 1232.

25 The mail fetching interval value calculated or

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5 A modification can also be made to the
structure of the dial-up unit DU of the dial-up network
facsimile device FXa of FIG. 11. FIG. 24 shows the
modified structure of the dial-up unit DU. In this
figure, the same components as in FIG. 12 are denoted by
10 the same reference numerals.

FIGS. 25 and 26 are a flowchart of an example process performed by the dial-up unit DU when the timer 34 activates the dial-up unit DU.

First, the dial-up unit DU calls the Internet service provider ISP, and makes a dial-up access to the Internet INET in step 1300. The dial-up unit DU then makes an access to the mail server Sma to inquire whether or not any electronic mail addressed to the network facsimile device FXa is stored in step 1301. If there is electronic mail addressed to the device FXa ("YES" in step 1302), an increment flag for specifying

5 If the result of step 1304 is "YES", the CPU
31 outputs the return command signal SSt in step 1305,
and fetches and stores electronic mail from the mail
server SMa in step 1306. The dial-up unit DU then waits
until the facsimile unit FU returns from the power-
10 saving mode ("NO" in step 1307).

15 Next, the current time is read in the dial-up
unit DU in step 1309, and a mail fetching interval
corresponding to the current time is read in step 1310.
The read time data is set to the timer 34 in step 1311.
The data modem 36, the network control unit 37, and the
20 Internet transmission control unit 38 are set into the
sleep mode in step 1312. The CPU 31 also sets itself
into the sleep mode in step 1313, and this operation
then comes to an end.

Meanwhile, if the facsimile unit FU is not in
25 the power-saving mode ("NO" in step 1304), the dial-up

unit DU fetches and stores electronic mail from the mail server Sma in step 1314. The contents of the stored electronic mail are transmitted to the facsimile unit FU in step 1315. The operation then moves on to step 1309, and the steps that follow are carried out.

If the result of step 1302 is "NO", it is checked whether or not the increment flag is "ON" in step 1316. If the result of step 1316 is "NO", the next mail fetching intervals are set at a predetermined value (see FIG. 20). Accordingly, the current time is read in step 1317, and the mail fetching interval value corresponding to the current time is fetched in step 1318. The fetched mail fetching interval value is stored in step 1319.

It is then checked whether or not the on-time flag in the current time zone is "ON" in step 1320. If the result of step 1320 is "NO", the increment flag is set at "ON" in step 1321, because the mail fetching intervals can be prolonged. If the result of step 1320 is "YES", step 1321 is not carried out, and the increment flag is not set at "ON".

The mail fetching interval value stored in step 1319 is set to the timer 34 in step 1322. The operation then moves on to step 1312, and the steps that follow are carried out.

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If the increment flag is set at "ON" ("YES" in step 1316), the stored mail fetching interval is read in step 1323, and it is determined which calculation mode is designated by the user in step 1324. Examples of the calculation mode includes: $N(n+1) = N(n) + KA$ (calculation mode 1; KA is a constant value); $N(n+1) = N(n) + 2KA$ (calculation mode 2; KA is a constant); and $N(n+1) = N(n)$ (calculation mode 3; not to be prolonged). A user can select one of the calculation modes through a predetermined mode setting process.

Using the selected calculation mode, a mail fetching interval until the next mail fetching is calculated, and the mail fetching interval value is updated in step 1325. It is checked whether or not the updated mail fetching interval value exceeds the upper limit (120 minutes, for instance) in step 1326. If the updated mail fetching interval value exceeds the upper limit ("YES" in step 1326), the updated mail fetching interval value is reset at the upper limit value in step 1327.

Next, the current time is read in step 1328, and it is checked whether or not the on-time flag in the current time zone is "ON" in step 1329. If the on-time flag is "ON" ("YES" in step 1329), the mail fetching interval value corresponding to the current time is

5 fetched in step 1330, because the mail fetching
intervals cannot be prolonged in the current time zone.
The mail fetching intervals are reset at the fetched
mail fetching interval value in step 1331. Also, the
increment flag is cleared in step 1332.

10 The mail fetching interval value calculated or
set in the above is stored in step 1333, and the stored
mail fetching interval value is set to the timer 34 in
step 1334. The operation then moves on to step 1312,
and the steps that follow are carried out.

15 In the above embodiments, the network
facsimile device is connected to an analog public
network, but the present invention can also be applied
to a case where the network facsimile device is
connected to a digital public network (ISDN).

20 Also, in the above embodiments, a dial-up
access is made to an analog public network, but the
present invention can also be applied to a case where a
dial-up access is made to a digital public network
(ISDN).

Further, the present invention can be applied
to any type of electronic mail terminal device that
comprises a main unit and a local area network unit or a
dial-up unit.

25 Also, the calculation mode formulas used for

prolonging the mail fetching intervals are not limited to those mentioned in this specification, but any suitable formula can be employed.

On the whole, the present invention is not
5 limited to the specifically disclosed embodiments, but variations and modifications may be made without departing from the scope of the present invention.

The present invention is based on Japanese
priority application Nos. 11-194746, filed on July 8,
10 1999, and 11-271054, filed on September 24, 1999, the entire contents of which are hereby incorporated by reference.

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WHAT IS CLAIMED IS:

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1. An electronic mail terminal device that transmits and receives information through electronic mail, comprising:

10 a communication unit that is connected to a network and performs electronic mail data exchange via the network; and

15 a power-saving control unit that sets the communication unit and said device into a power-saving mode when said device detects that a first power-saving timing condition is satisfied, and cancels the power-saving mode when said device detects that a second power-saving timing condition is satisfied.

20

2. The electronic mail terminal device as claimed in claim 1, wherein:

25 the communication unit is a local area network communication unit that is connected to a local area

power-saving mode of the local area network
communication unit at the predetermined mail fetching
intervals so as to fetch electronic mail addressed to
said device through the local area network communication
5 unit,

where electronic mail has been fetched, the
power-saving control unit canceling the power-saving
mode of said device and outputting electronic mail
information to said device through the local area
10 network communication unit, and

where no electronic mail has been fetched, the
power-saving control unit not canceling the power-saving
mode of said device, and setting the local area network
communication unit back into the power-saving mode after
15 a stand-by state lasts longer than the predetermined
period of time.

20

5. The electronic mail terminal device as
claimed in claim 3, wherein the mail fetching intervals
can be set at will.

25

6. The electronic mail terminal device as claimed in claim 3, wherein the mail fetching intervals have a different value set in each time zone.

5

7. The electronic mail terminal device as claimed in claim 1, wherein:

10 the communication unit is a dial-up communication unit that makes a dial-up access to an Internet service provide via a public network, and performs electronic mail data exchange via the Internet;

15 the first power-saving timing condition is that a stand-by state lasts longer than a predetermined period of time; and

the second power-saving timing condition is that an event occurs.

20

8. The electronic mail terminal device as claimed in claim 7, wherein

25 the power-saving control unit cancels the

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power-saving mode at predetermined mail fetching intervals so as to fetch electronic mail addressed to said device through the dial-up communication unit.

5

9. The electronic mail terminal device as claimed in claim 8, wherein

10 the power-saving control unit cancels the power-saving mode of the dial-up communication unit at the predetermined mail fetching intervals so as to fetch electronic mail addressed to said device,

where electronic mail has been fetched, the
15 power-saving control unit canceling the power-saving mode of said device and outputting electronic mail information to said device through the dial-up communication unit, and

where no electronic mail has been fetched, the
20 power-saving control unit not canceling the power-saving mode of said device and then setting the dial-up communication unit back into the power-saving mode after a stand-by state lasts longer than the predetermined period of time.

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condition is satisfied.

5

13. The method as claimed in claim 12,
wherein:

the power-saving mode setting step includes
the step of setting said device and a local area network
10 communication unit, which is connected to a local area
network and performs electronic mail data exchange via
the local area network, into the power-saving mode, when
a stand-by state lasts longer than a predetermined
period of time; and
15 the canceling step includes the step of
canceling the power-saving mode when an event occurs.

20

14. The method as claimed in claim 13,
wherein

the canceling step includes the step of
canceling the power-saving mode at predetermined mail
25 fetching intervals so as to fetch electronic mail

addressed to said device through the local area network communication unit.

5

15. The method as claimed in claim 14,
wherein

the canceling step includes the step of
10 canceling the power-saving mode of the local
area network communication unit at the predetermined
mail fetching intervals so as to fetch electronic mail
addressed to said device through the local area network
communication unit,

15 said method further comprising the steps of:
where electronic mail has been fetched,
outputting electronic mail information to said device
through the local area network communication unit after
canceling the power-saving mode of said device; and

20 where no electronic mail has been fetched,
setting the local area network communication unit back
into the power-saving mode when a stand-by state lasts
longer than the predetermined period of time, not
canceling the power-saving mode of said device.

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16. The method as claimed in claim 14,
wherein the canceling step includes the step of setting
the mail fetching intervals at will.

5

17. The method as claimed in claim 14,
wherein the canceling step includes the step of setting
10 a different value in each time zone for the mail
fetching intervals.

15

18. The method as claimed in claim 12,
wherein:

the power-saving mode setting step includes
the step of setting said device and a dial-up
20 communication unit, which makes an dial-up access to an
Internet service provider via a public network and
performs electronic mail data exchange via the Internet,
into a power-saving mode, when a stand-by state lasts
longer than a predetermined period of time; and
25 the canceling step includes the step of

canceling the power-saving mode when an event occurs.

5

19. The method as claimed in claim 18,
wherein

the canceling step includes the step of
canceling the power-saving mode at predetermined mail
10 fetching intervals so as to fetch electronic mail
addressed to said device through the dial-up
communication unit.

15

20. The method as claimed in claim 19,
wherein

the canceling step includes the step of
20 canceling the power-saving mode of the dial-up
communication unit at the predetermined mail fetching
intervals so as to fetch electronic mail addressed to
said device,

25

said method further comprising the steps of:
where electronic mail has been fetched,

outputting electronic mail information to said device
through the dial-up communication unit after canceling
the power-saving mode of said device; and

where no electronic mail has been fetched,
5 setting the dial-up communication unit back into the
power-saving mode when a stand-by state lasts longer
than the predetermined period of time, not canceling the
power-saving mode of said device.

10

21. The method as claimed in claim 19,
wherein the canceling step includes the step of setting
15 the mail fetching intervals at will.

20 22. The method as claimed in claim 19,
wherein the canceling step includes the step of setting
a different value in each time zone for the mail
fetching intervals.

25

23. The electronic mail terminal device as claimed in claim 3, wherein:

the power-saving control unit cancels the power-saving mode of the local area network communication unit at the predetermined mail fetching intervals so as to fetch electronic mail addressed to said device through the local area network communication unit; and

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation.

15

24. The electronic mail terminal device as claimed in claim 23, wherein:

where electronic mail has been fetched, the power-saving control unit resets the mail fetching intervals to the original predetermined mail fetching intervals.

25

25. The electronic mail terminal device as claimed in claim 24, wherein:

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation, not canceling the power-saving mode of said device, and sets the local area network communication unit back into the power-saving mode when a stand-by state lasts longer than the predetermined period of time, and

where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode of said device, outputs electronic mail information to said device through the local area network communication unit, and then resets the mail fetching intervals to the original predetermined mail fetching intervals.

26. The electronic mail terminal device as claimed in claim 8, wherein:

the power-saving control unit cancels the power-saving mode of the dial-up communication unit at the predetermined mail fetching intervals so as to fetch electronic mail addressed to said device through the

dial-up communication unit;

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation; and

5 where electronic mail has been fetched, the power-saving control unit resets the mail fetching intervals to the original predetermined mail fetching intervals.

10

27. The electronic mail terminal device as claimed in claim 26, wherein:

15 where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by a prescribed arithmetic operation, not canceling the power-saving mode of said device, and sets the dial-up communication unit back into the power-
20 saving mode when a stand-by state lasts longer than the predetermined period of time; and

where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode of said device, outputs electronic mail information to
25 said device through the dial-up communication unit, and

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then resets the mail fetching intervals to the original predetermined mail fetching intervals.

5

28. The electronic mail terminal device as claimed in claim 23, wherein:

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by the prescribed arithmetic operation, and resets the mail fetching intervals to the original predetermined mail fetching intervals at a predetermined time.

15

29. The electronic mail terminal device as claimed in claim 28, wherein:

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by the prescribed arithmetic operation, not canceling the power-saving mode of said device, and then sets the local area network communication unit back into

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where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode of said device, and outputs electronic mail information to said device through the local area network communication unit; and

10 original predetermined mail fetching intervals.

claimed in claim 26, wherein:

```
20  resets the mail fetching intervals to the original
    predetermined mail fetching intervals at a predetermined
    time.
```

31. The electronic mail terminal device as claimed in claim 30, wherein:

where no electronic mail has been fetched, the power-saving control unit prolongs the mail fetching intervals by the prescribed arithmetic operation, not canceling the power-saving mode of said device, and sets the dial-up communication unit back into the power-saving mode when a stand-by state lasts longer than the predetermined period of time;

where electronic mail has been fetched, the power-saving control unit cancels the power-saving mode of said device, and outputs electronic mail information to said device through the dial-up communication unit; and

at the predetermined time, the power-saving control unit resets the mail fetching intervals to the original predetermined mail fetching intervals.

20

32. The electronic mail terminal device as claimed in claim 24, further comprising a semiconductor non-volatile memory that stores the mail fetching intervals.

25

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33. The electronic mail terminal device as claimed in claim 24, wherein the arithmetic operation is selected from a plurality of prescribed arithmetic operations by a user.

5

34. The electronic mail terminal device as claimed in claim 26, further comprising a semiconductor non-volatile memory that stores the mail fetching intervals.

10
15

35. The electronic mail terminal device as claimed in claim 26, wherein the arithmetic operation is selected from a plurality of prescribed arithmetic operations by a user.

20
25

36. The electronic mail terminal device as

claimed in claim 28, further comprising a semiconductor non-volatile memory that stores the mail fetching intervals.

5

37. The electronic mail terminal device as claimed in claim 28, wherein the arithmetic operation is selected from a plurality of prescribed arithmetic operations by a user.

10

15

38. The electronic mail terminal device as claimed in claim 30, further comprising a semiconductor non-volatile memory that stores the mail fetching intervals.

20

39. The electronic mail terminal device as claimed in claim 30, wherein the arithmetic operation is

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where electronic mail has been fetched,

resetting the prolonged mail fetching intervals to the original predetermined mail fetching intervals.

5

42. The method as claimed in claim 14,
wherein

the canceling step includes the step of
10 canceling the power-saving mode of the local area
network communication unit at the predetermined mail
fetching intervals so as to fetch electronic mail
addressed to said device through the local area network
communication unit,

15 said method further comprising the steps of:

where no electronic mail has been fetched,
prolonging the mail fetching intervals by the prescribed
arithmetic operation, not canceling the power-saving
mode of said device, and then setting the local area
20 network communication unit back into the power-saving
mode when a stand-by state lasts longer than the
predetermined period of time; and

where electronic mail has been fetched,
canceling the power-saving mode of said device,
25 outputting electronic mail information to said device

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through the local area network communication unit, and
then resetting the mail fetching intervals to the
original predetermined mail fetching intervals.

5

43. The method as claimed in claim 19,
wherein

10 the canceling step includes the step of
canceling the power-saving mode of the dial-up
communication unit at the mail fetching intervals so as
to fetch electronic mail addressed to said device
through the dial-up communication unit,

15 said method further comprising the steps of:

where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation; and

20 where electronic mail has been fetched,
resetting the prolonged mail fetching intervals to the
original predetermined mail fetching intervals.

25

44. The method as claimed in claim 19,
wherein

the canceling step includes the step of
canceling the power-saving mode of the dial-up

5 communication unit at the mail fetching intervals so as
to fetch electronic mail addressed to said device
through the dial-up communication unit,

said method further comprising the steps of:

where no electronic mail has been fetched,
10 prolonging the mail fetching intervals by a prescribed
arithmetic operation, not canceling the power-saving
mode of said device, and then setting the dial-up
communication unit back into the power-saving mode when
a stand-by state lasts longer than the predetermined
15 period of time; and

where electronic mail has been fetched,
canceling the power-saving mode of said device,
outputting electronic mail information to said device
through the dial-up communication unit, and then
20 resetting the prolonged mail fetching intervals to the
original predetermined mail fetching intervals.

the canceling step includes the step of canceling the power-saving mode of the local area

said method further comprising the steps of:

10 where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation; and

20 46. The method as claimed in 14, wherein
the canceling step includes the step of
canceling the power-saving mode of the local area
network communication unit at the predetermined mail
fetching intervals so as to fetch electronic mail
25 addressed to said device through the local area network

communication unit,

said method further comprising the steps of:

where no electronic mail has been fetched,

prolonging the mail fetching intervals by a prescribed

5 arithmetic operation, not canceling the power-saving
mode of said device, and then setting the local area
network communication unit back into the power-saving
mode when a stand-by state lasts longer than the
predetermined period of time;

10 where electronic mail has been fetched,
canceling the power-saving mode of said device, and
outputting electronic mail information to said device;
and

at a predetermined time, resetting the mail
15 fetching intervals to the original predetermined mail
fetching intervals.

20

47. The method as claimed in 19, wherein
the canceling step includes the step of
canceling the power-saving mode of the dial-up
communication unit at the mail fetching intervals so as
25 to fetch electronic mail addressed to said device

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through the dial-up communication unit,

said method further comprising the steps of:

where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
5 arithmetic operation; and

at a predetermined time, resetting the
prolonged mail fetching intervals to the original
predetermined mail fetching intervals.

10

48. The method as claimed in claim 19,
wherein

15 the canceling step includes the step of
canceling the power-saving mode of the dial-up
communication unit at the mail fetching intervals so as
to fetch electronic mail addressed to said device
through the dial-up communication unit,

20 said method further comprising the steps of:

where no electronic mail has been fetched,
prolonging the mail fetching intervals by a prescribed
arithmetic operation, not canceling the power-saving
mode of said device, and then setting the dial-up
25 communication unit back into the power-saving mode when

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a stand-by state lasts longer than the predetermined period of time;

where electronic mail has been fetched,
canceling the power-saving mode of said device, and
5 outputting electronic mail information to said device
through the dial-up communication unit; and

at a predetermined time, resetting the mail
fetching intervals to the original predetermined mail
fetching intervals.

10

49. The method as claimed in claim 41,
15 wherein the mail fetching intervals are stored in a
semiconductor non-volatile memory.

20

50. The method as claimed in claim 41,
wherein the arithmetic operation is selected from a
plurality of prescribed arithmetic operations by a user.

25

51. The method as claimed in claim 43,
wherein the mail fetching intervals are stored in a
semiconductor non-volatile memory.

5

52. The method as claimed in claim 43,
wherein the arithmetic operation is selected from a
10 plurality of prescribed arithmetic operations by a user.

53. The method as claimed in claim 45,
wherein the mail fetching intervals are stored in a
semiconductor no-volatile memory.

20

54. The method as claimed in claim 45,
wherein the arithmetic operation is selected from a
plurality of prescribed arithmetic operations by a user.

25

55. The method as claimed in claim 47,
wherein the mail fetching intervals are stored in a
semiconductor non-volatile memory.

5

56. The method as claimed in claim 47,
wherein the arithmetic operation is selected from a
10 plurality of prescribed arithmetic operations by a user.

57. The electronic mail terminal device as
15 claimed in claim 1, wherein:
the communication unit is a local area network
communication unit that is connected to a local area
network and performs electronic mail data exchange via
20 the local area network;

when a current time is within a predetermined
nighttime zone, the power-saving control unit sets the
local area network and said device into the power-saving
mode; and
25 when the current time comes out of the

predetermined nighttime zone, the power-saving control unit cancels the power-saving mode of the local area network communication unit.

5

58. The electronic mail terminal device as claimed in claim 57, further comprising

10 a nighttime power-saving mode setting unit that determines whether or not a power-saving mode can be set in the predetermined nighttime zone,

wherein:

when the current time is within the
15 predetermined nighttime zone, the power-saving control unit sets said device into the power-saving mode;

when the nighttime power-saving mode setting unit allows the power-saving mode in the nighttime zone, the power-saving control unit sets the local area
20 network communication unit into the power-saving mode; and

when the current time comes out of the nighttime zone, the power-saving control unit cancels the power-saving mode of the local area network
25 communication unit.

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59. The electronic mail terminal device as claimed in claim 57, wherein

the power-saving control unit is provided with a timer for detecting an end of the nighttime zone, and,
5 based on an output of the timer, cancels the power-saving mode of the local area network communication unit.

10

60. The electronic mail terminal device as claimed in claim 1, wherein:

the communication unit is a dial-up communication unit that makes a dial-up access to an
15 Internet service provider via a public network and performs electronic mail data exchange via the Internet;

when a current time is within a predetermined nighttime zone, the power-saving control unit sets the dial-up communication unit and said device into the
20 power-saving mode; and

when the current time comes out of the predetermined nighttime zone, the power-saving control unit cancels the power-saving mode of the dial-up communication unit.

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saving mode of the dial-up communication unit.

5

63. The method as claimed in claim 12,

wherein:

the power-saving mode setting step includes
the step of setting said device and a local area network
10 communication unit, which is connected to a local area
network and performs electronic mail data exchange via
the local area network, into the power-saving mode, when
a current time is within a predetermined nighttime zone;
and

15

the canceling step includes the step of
canceling the power-saving mode of the local area
network communication unit when the current time comes
out of the predetermined nighttime zone.

20

64. The method as claimed in claim 63,

wherein:

25

the power-saving mode setting step includes

the steps of:

when the current time is within the
predetermined nighttime zone, setting said device into
the power-saving mode; and

5 when a nighttime power-saving mode setting
unit determines that a power-saving mode can be set in
the nighttime zone, setting the local area network
communication unit into the power-saving mode; and

the canceling step includes the step of,

10 when the current time comes out of the night
time zone, canceling the power-saving mode of the local
area network communication unit.

15

65. The method as claimed in claim 63,
wherein the canceling step includes the step of,

based on an output of a timer that detects an
20 end of the nighttime zone, canceling the power-saving
mode of the local area network communication unit.

25

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66. The method as claimed in claim 12,

wherein:

the power-saving mode setting step includes
the step of setting said device and a dial-up
5 communication unit, which makes a dial-up access to an
Internet service provider via a public network and
performs electronic mail data exchange via the Internet,
into the power-saving mode, when a current time is
within a predetermined nighttime zone; and

10 the canceling step includes the step of
canceling the power-saving mode of the dial-up
communication unit when the current time comes out of
the predetermined nighttime zone.

15

67. The method as claimed in claim 66,

wherein:

20 the power-saving mode setting step includes
the steps of:

when the current time is within the
predetermined nighttime zone, setting said device into
the power-saving mode; and

25 when a nighttime power-saving mode setting

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unit determines that a power-saving mode can be set in the nighttime zone, setting the dial-up communication unit into the power-saving mode; and

the canceling step includes the step of,

5 when the current time comes out of the night time zone, canceling the power-saving mode of the dial-up communication unit.

10

68. The method as claimed in claim 66, wherein the canceling step includes the step of,

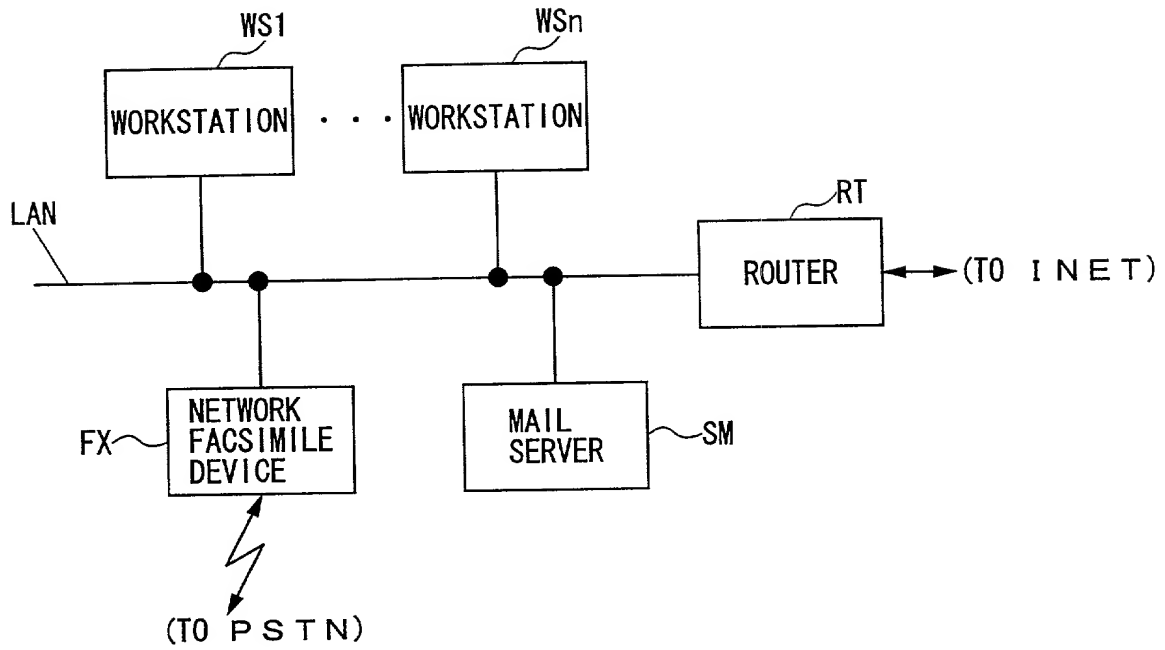
15 based on an output of a timer that detects an end of the nighttime zone, canceling the power-saving mode of the dial-up communication unit.

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An electronic mail terminal device having a power-saving function, and a method of controlling such an electronic mail terminal device are provided. When electronic mail is neither being fetched nor being transmitted, a local area network communication unit is in a sleep mode in the electronic mail terminal device of the present invention. Accordingly, the power consumption of the local area network unit can be dramatically reduced.

10 dramatically reduced.

FIG. 1



F I G. 2

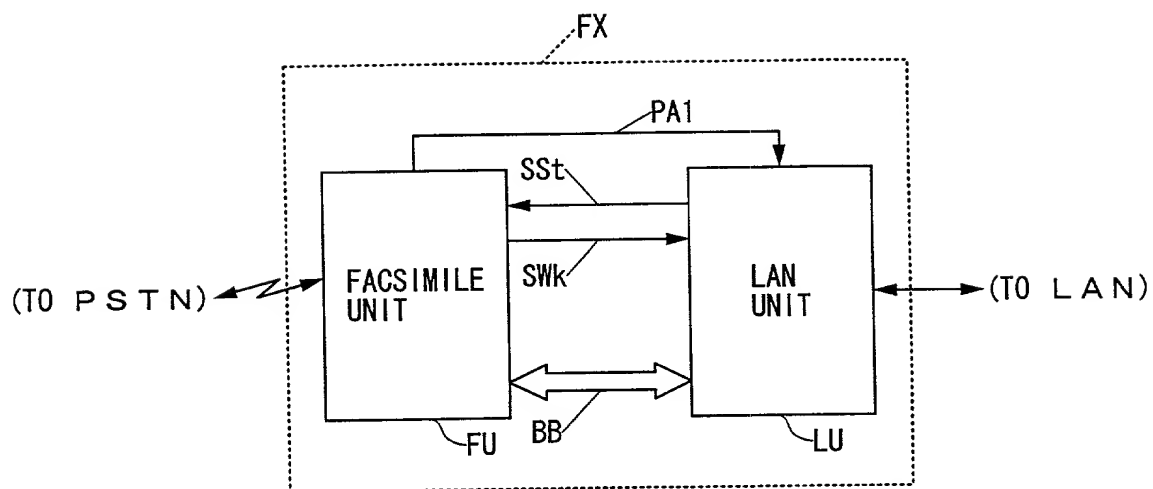


FIG. 3

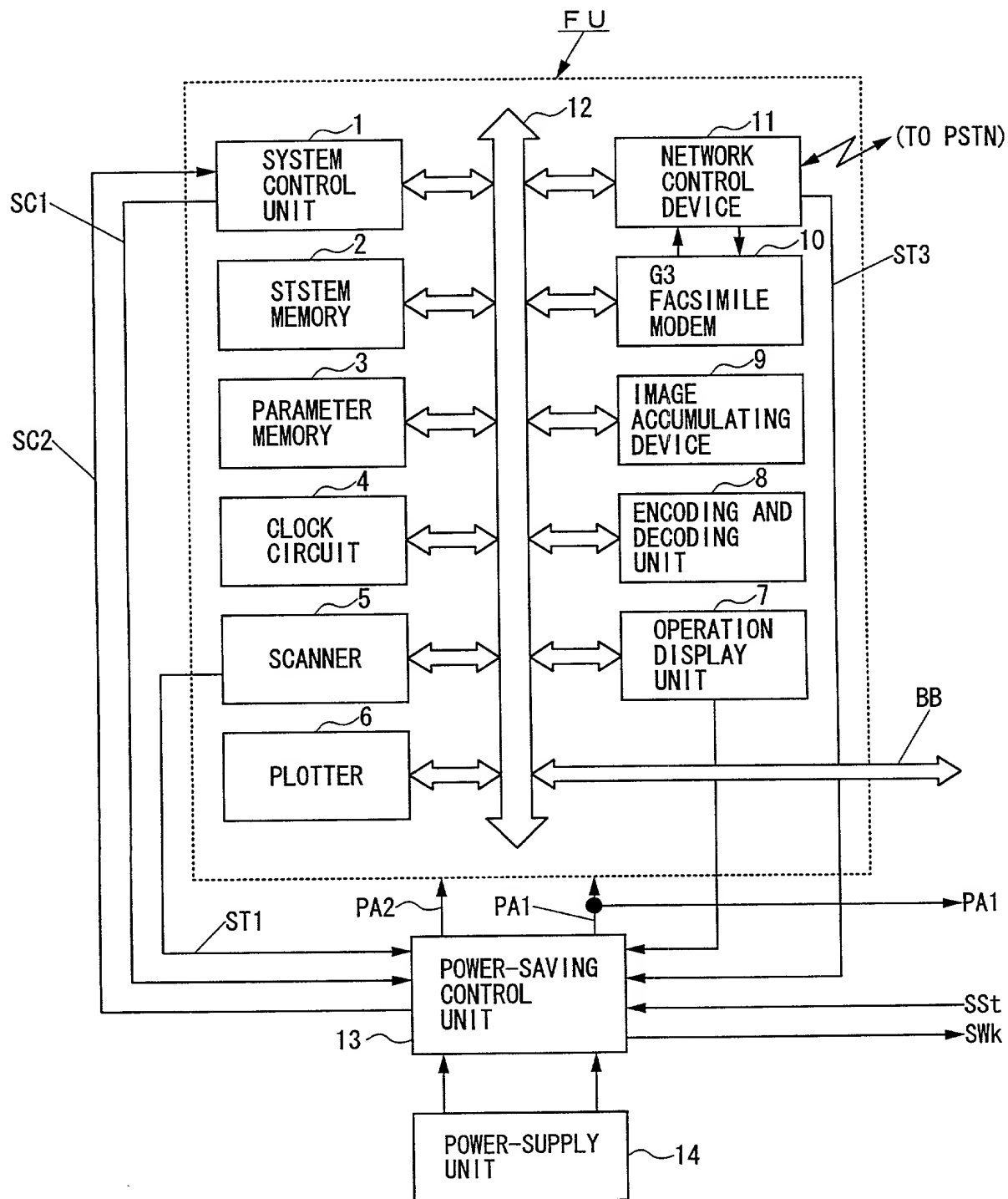
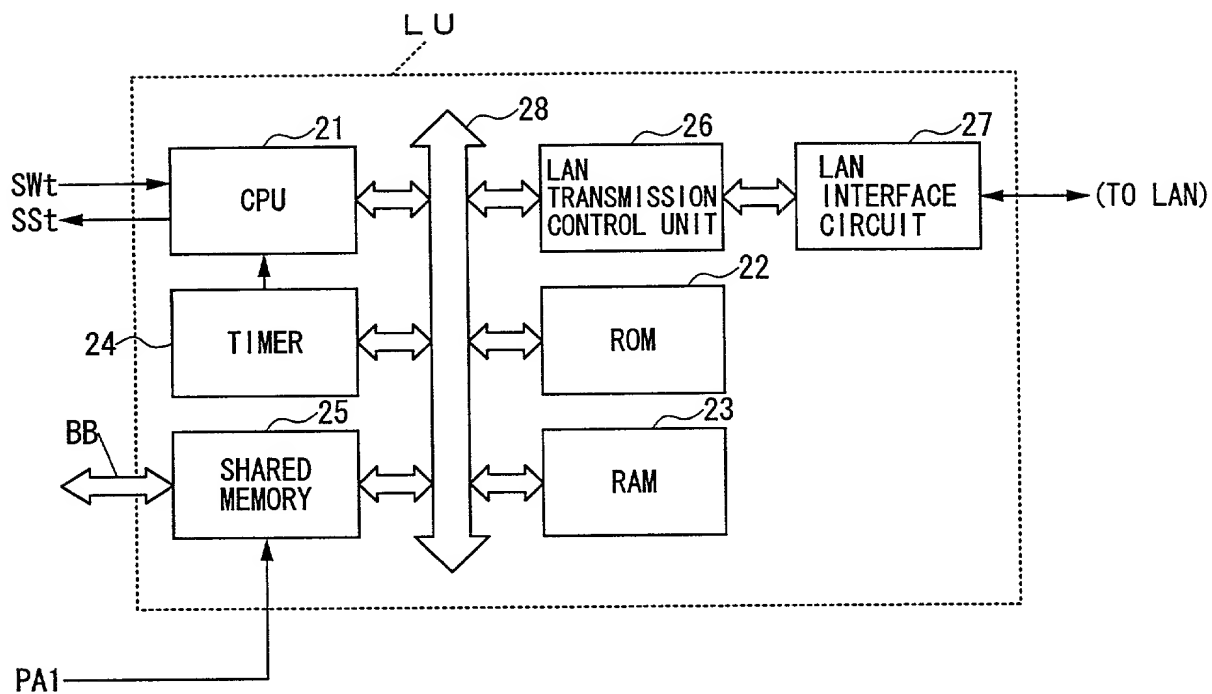


FIG. 4



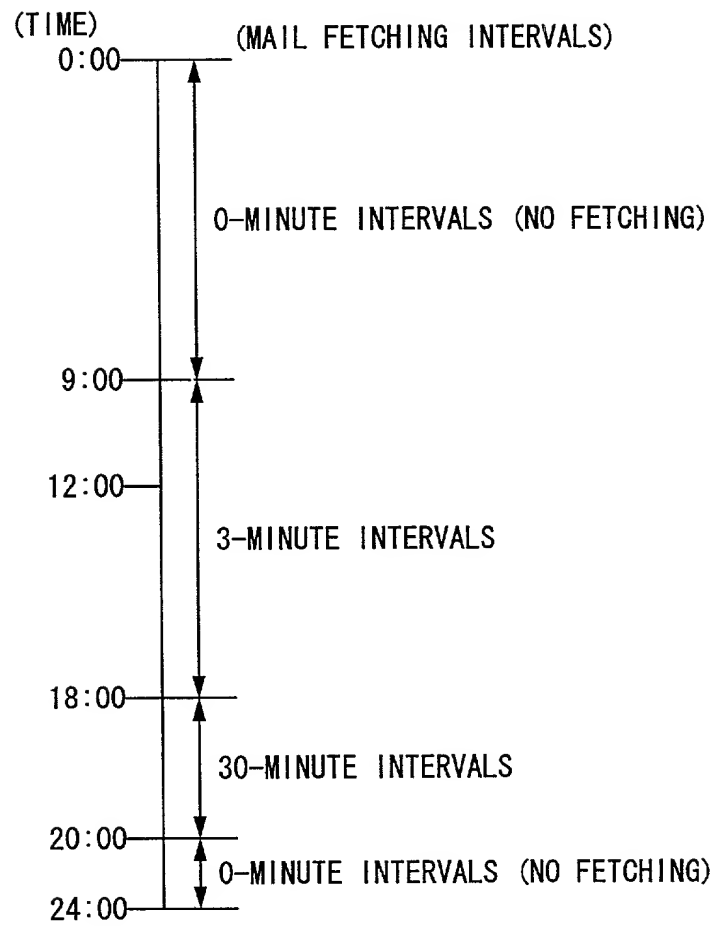
[illegible]

FIG. 6

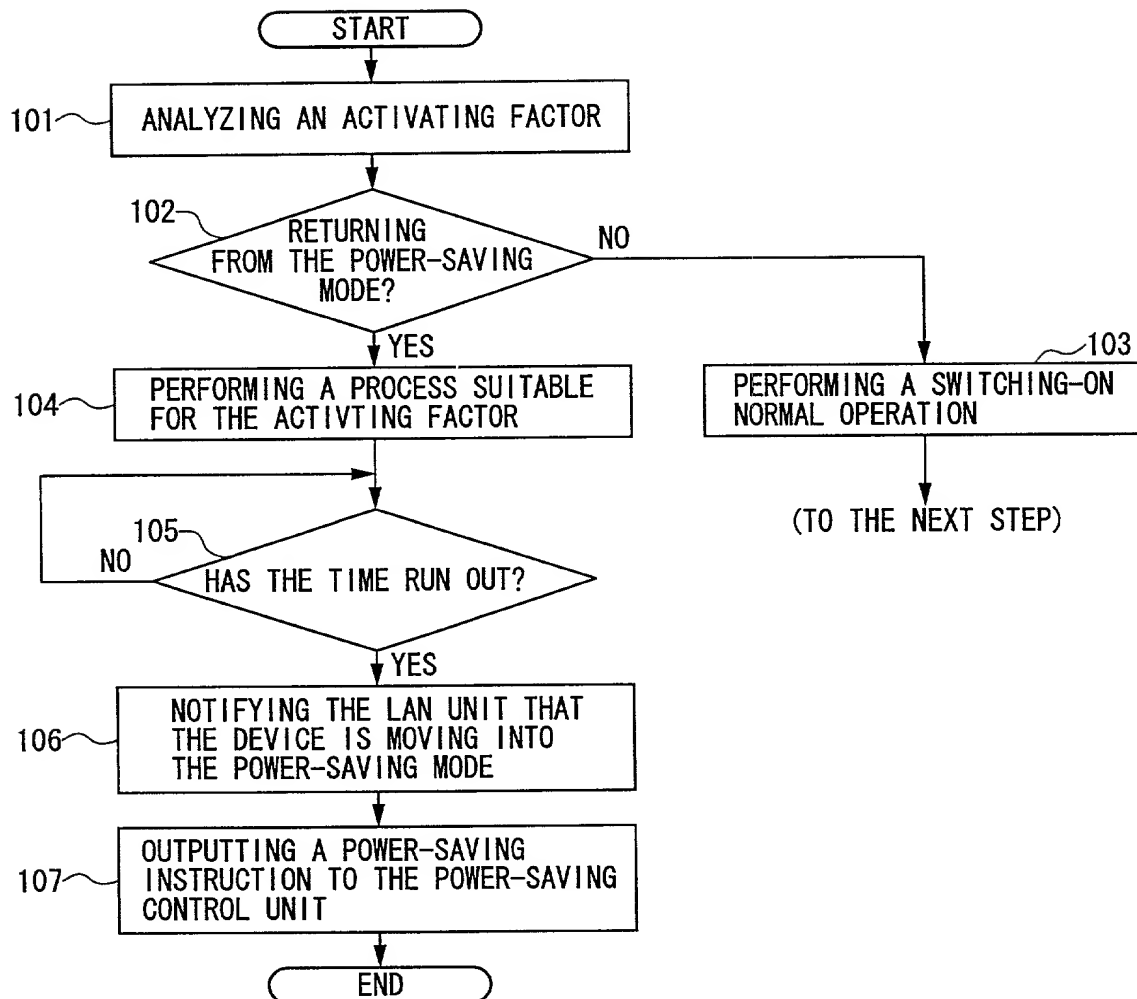


FIG. 8

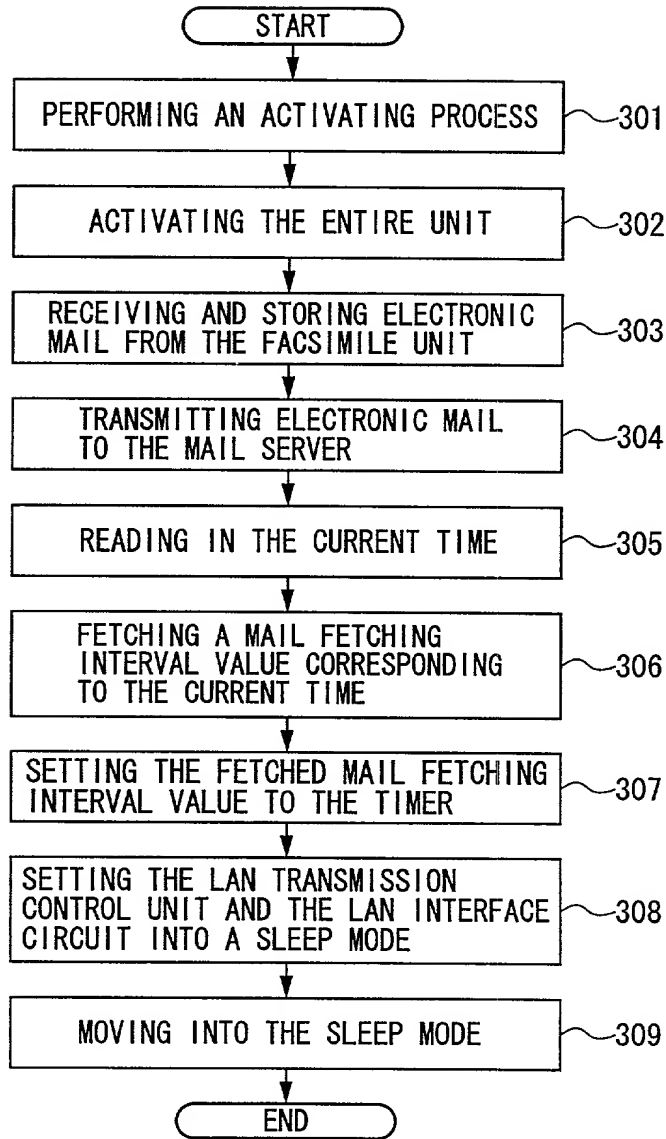
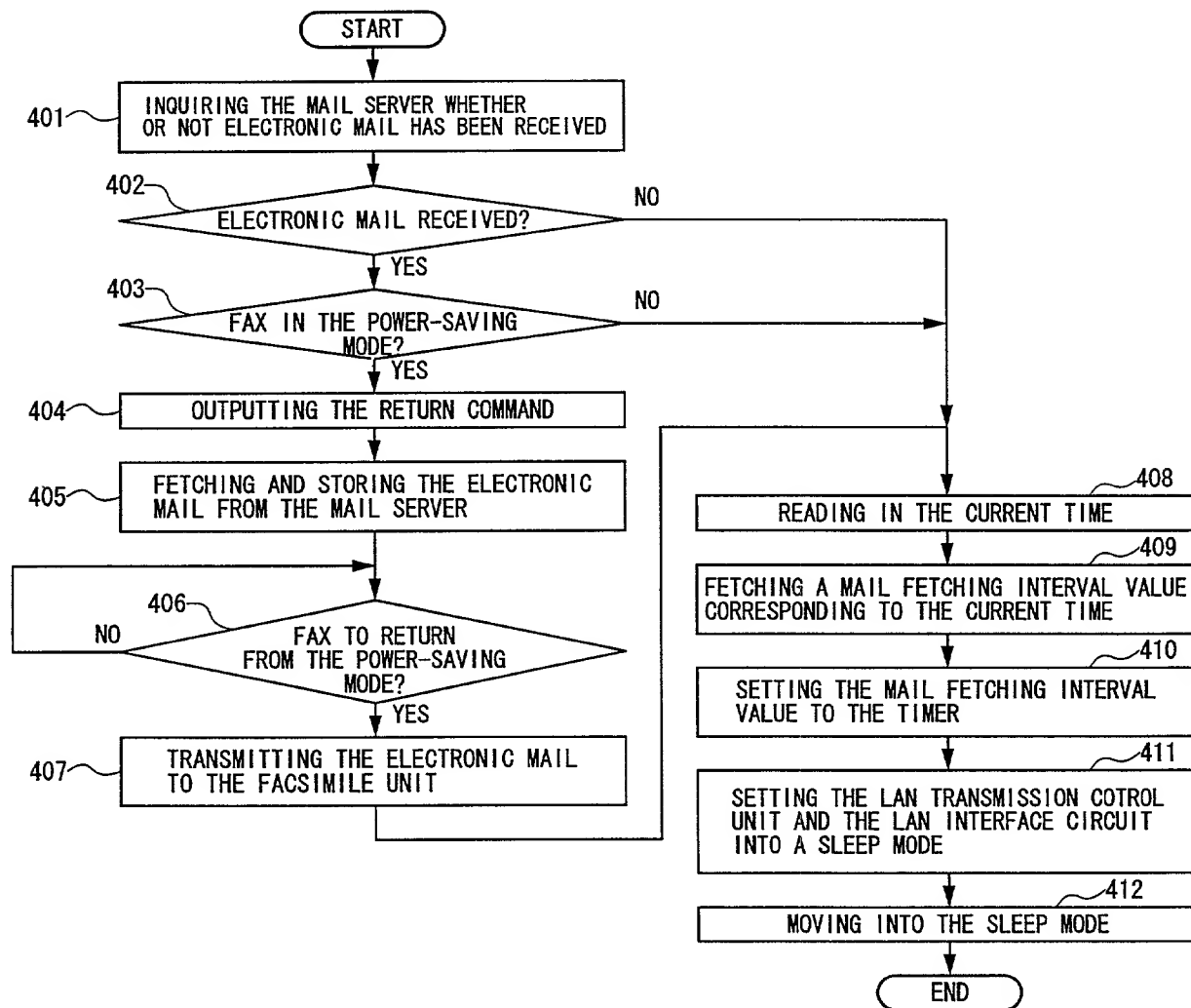
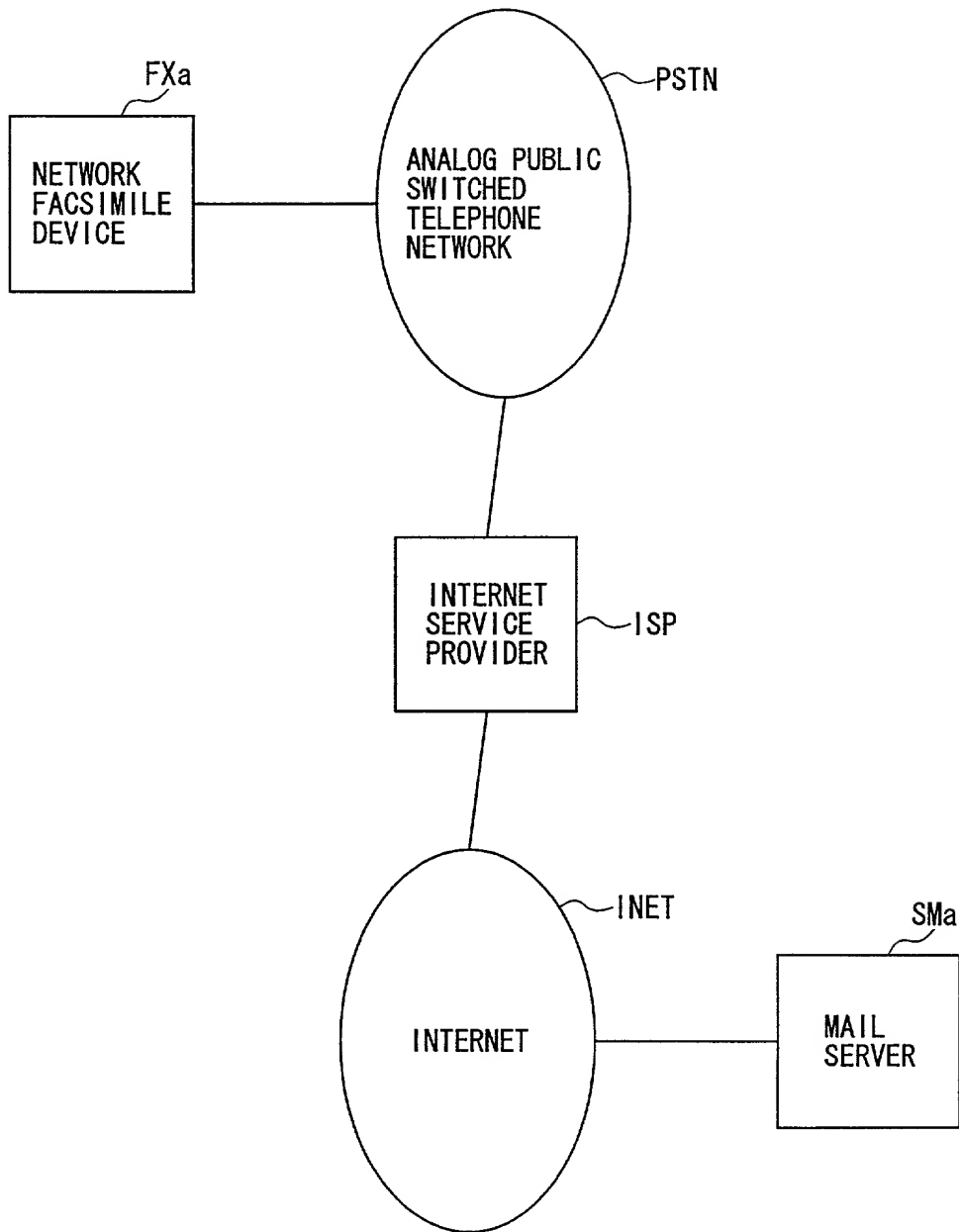


FIG. 9



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FIG. 10



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FIG. 11

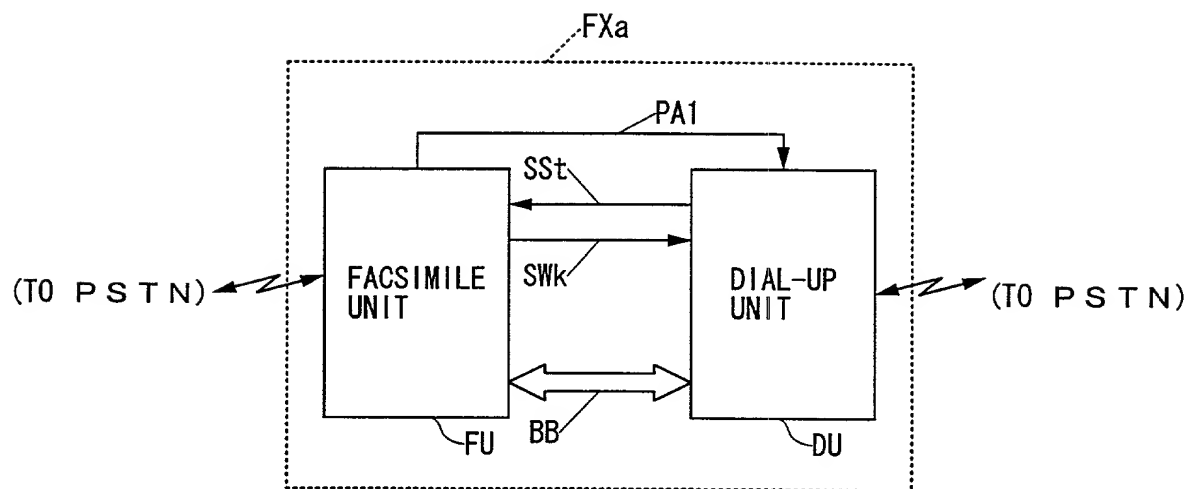


FIG. 12

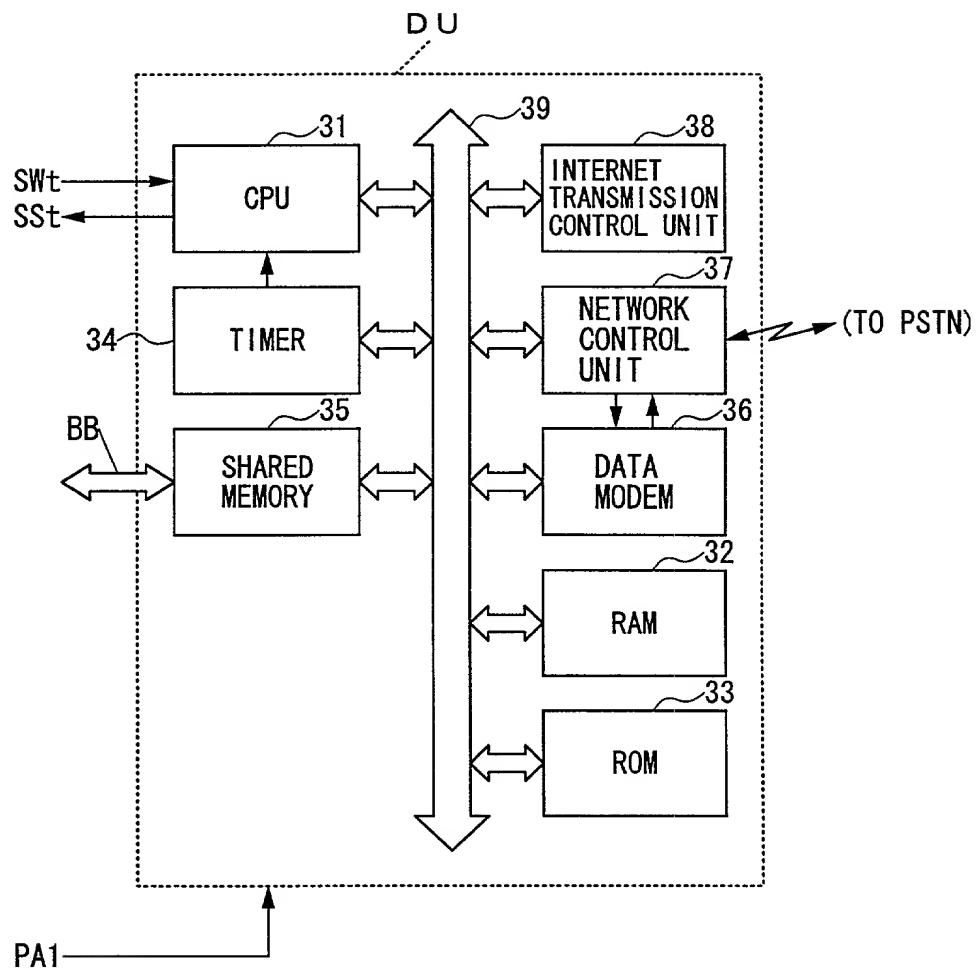


FIG. 13

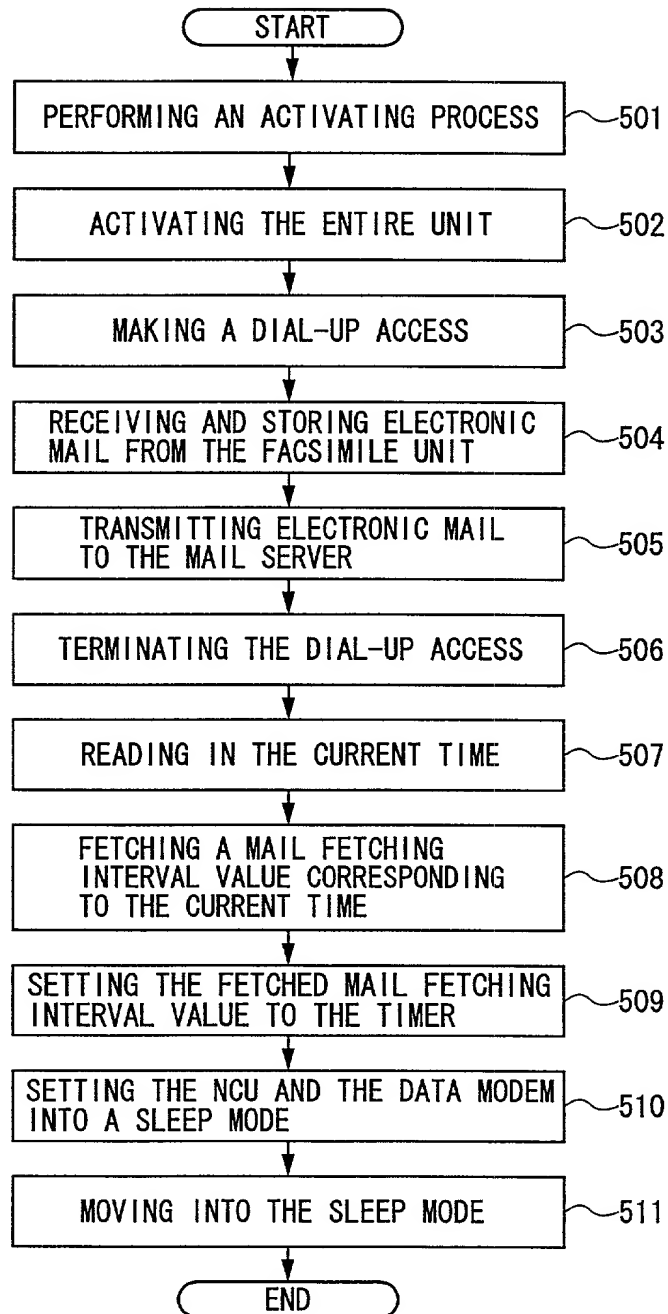


FIG. 14

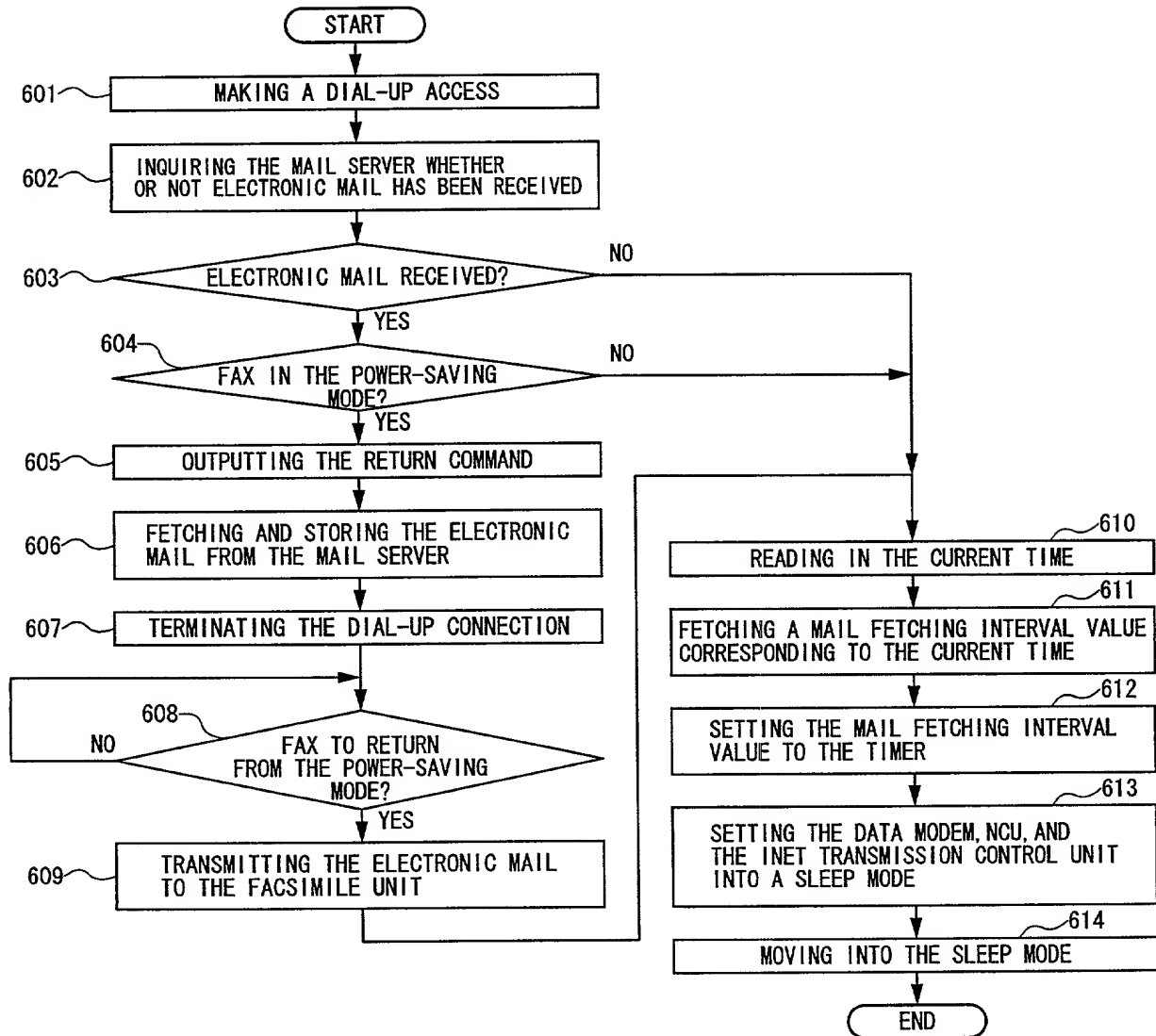
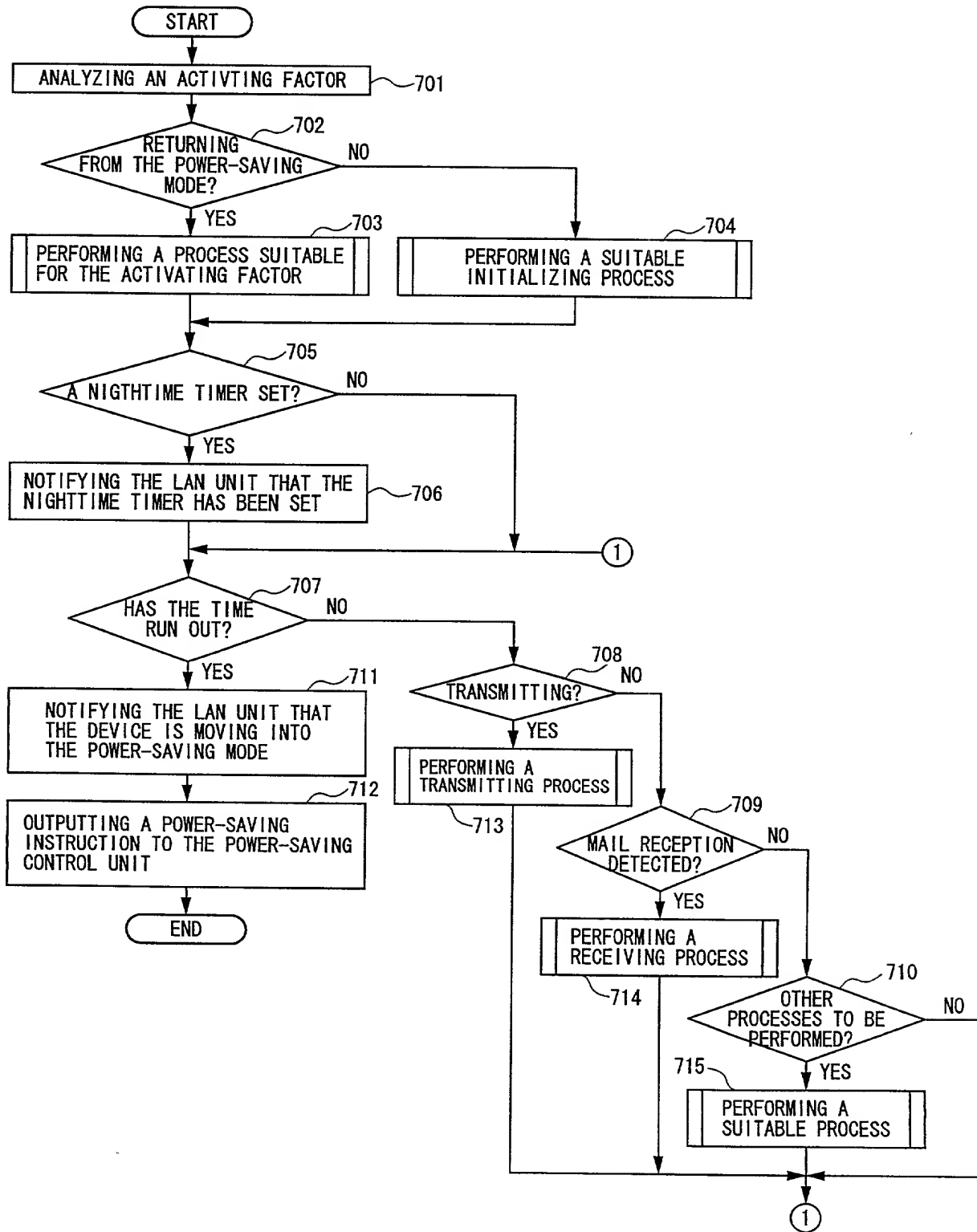
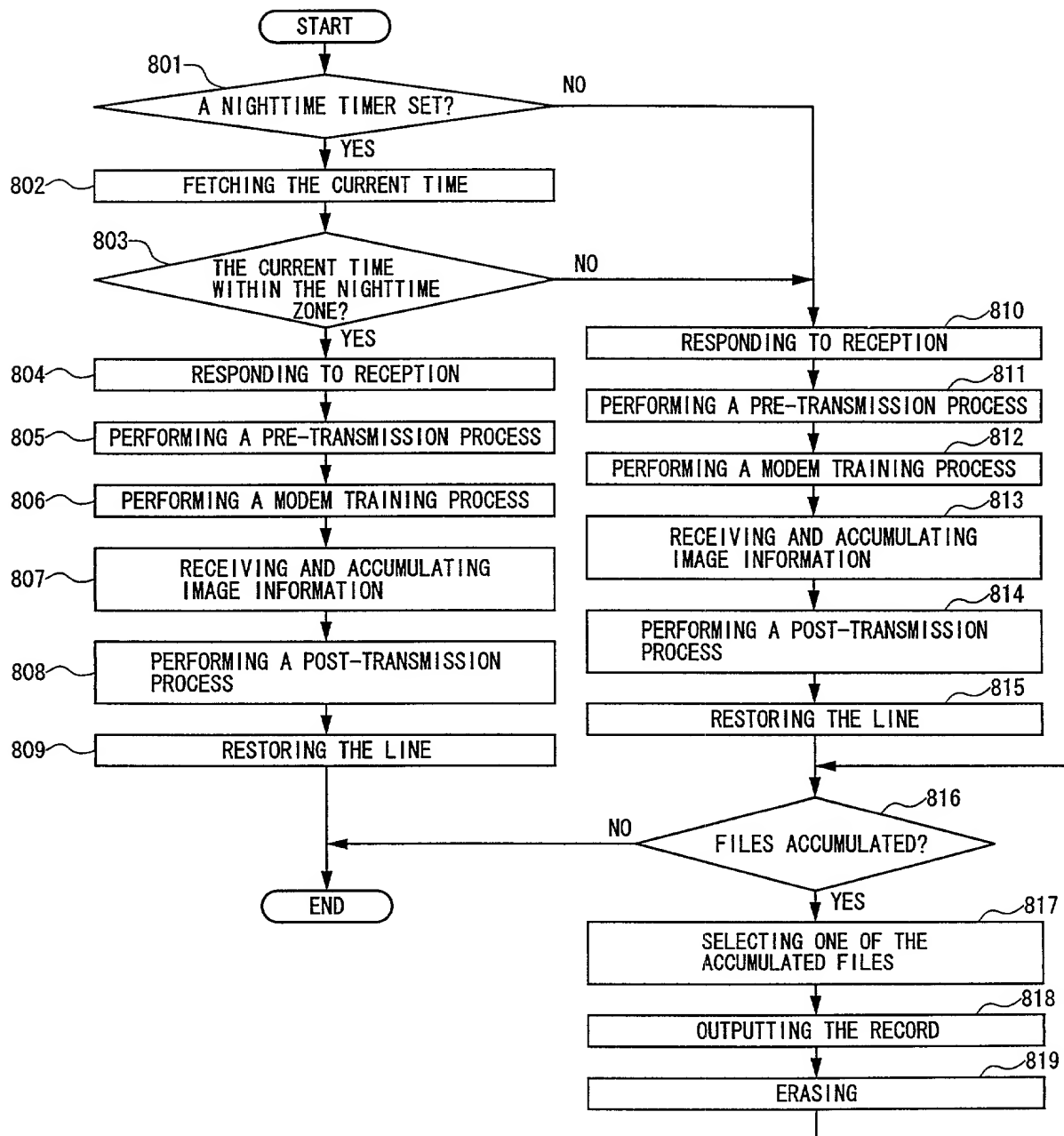


FIG. 15



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FIG. 16



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FIG. 17

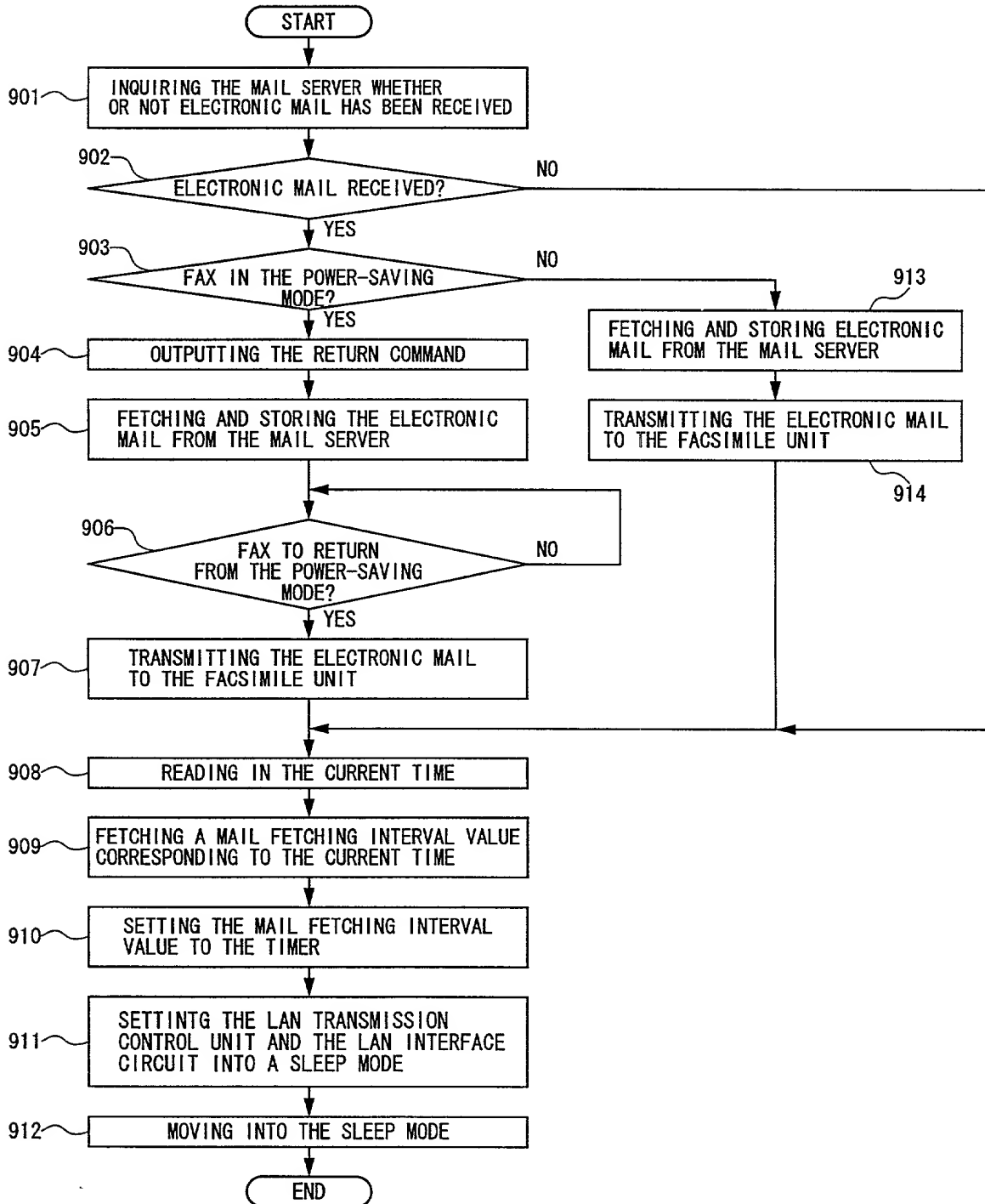


FIG. 18

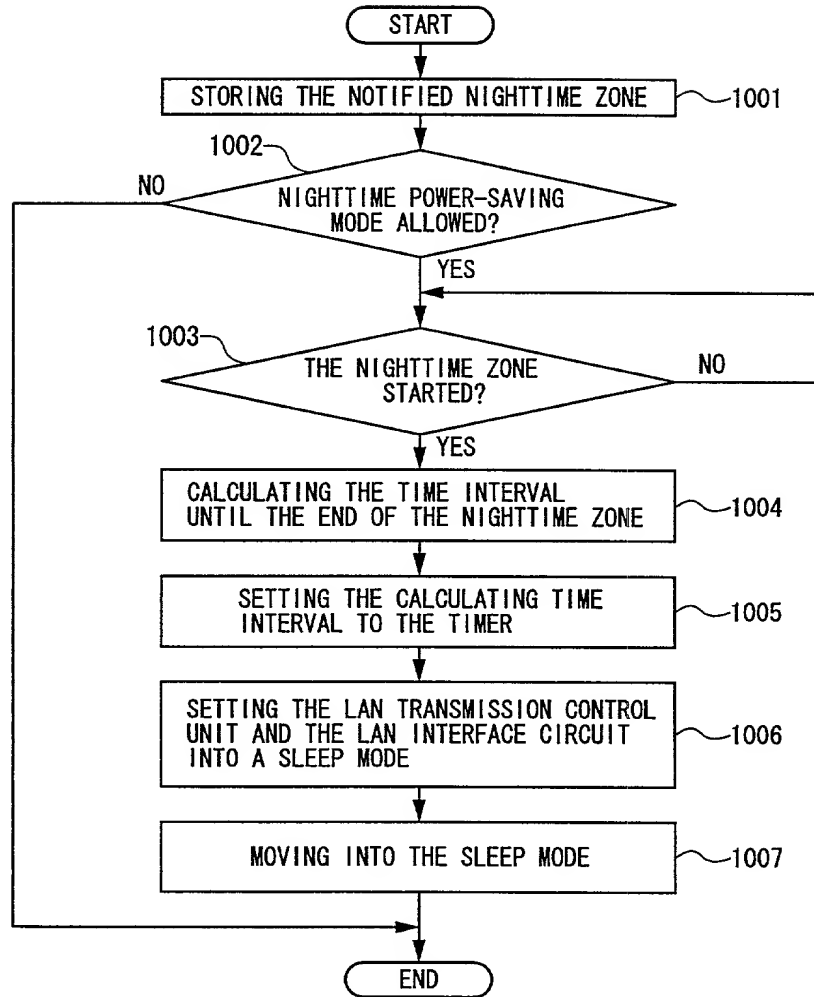


FIG. 19

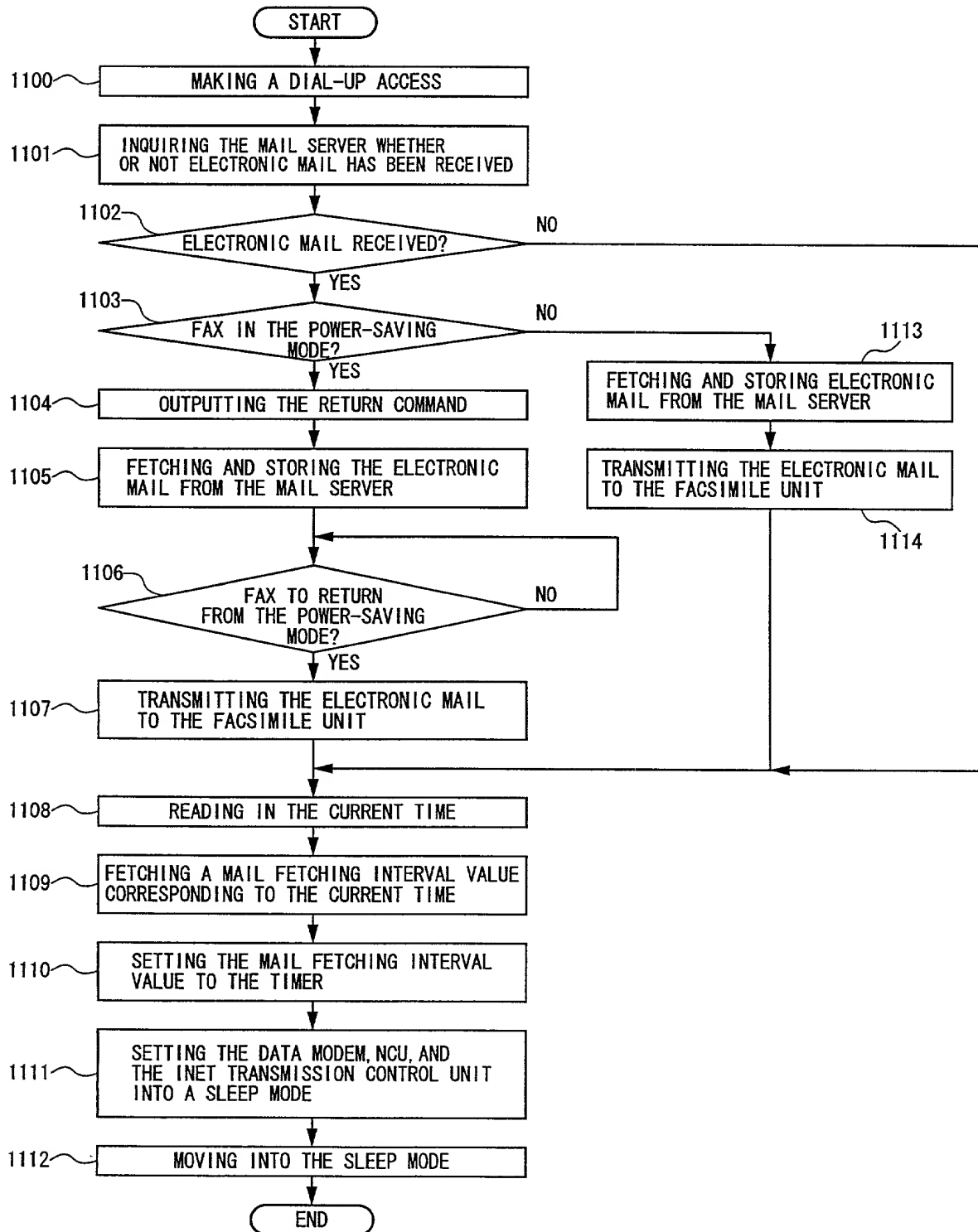
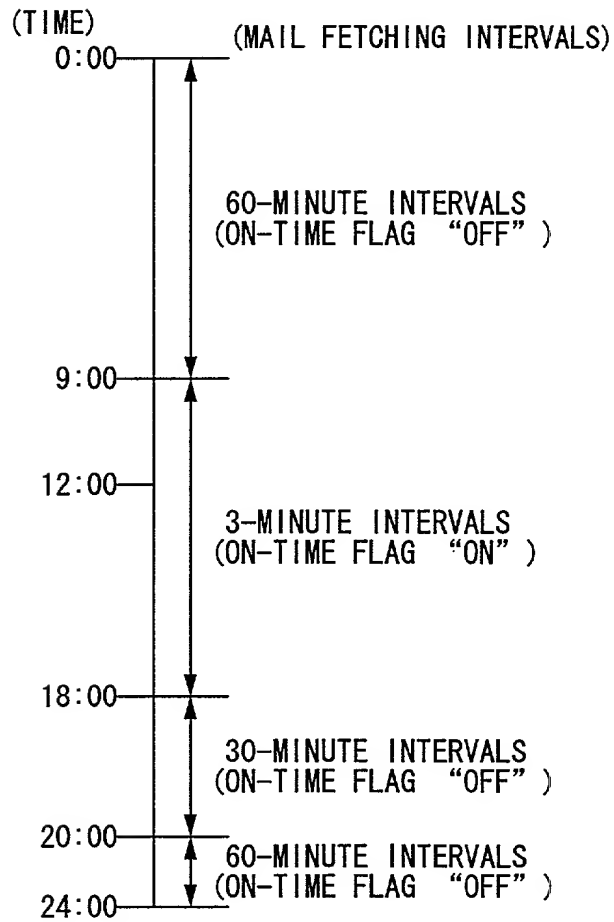
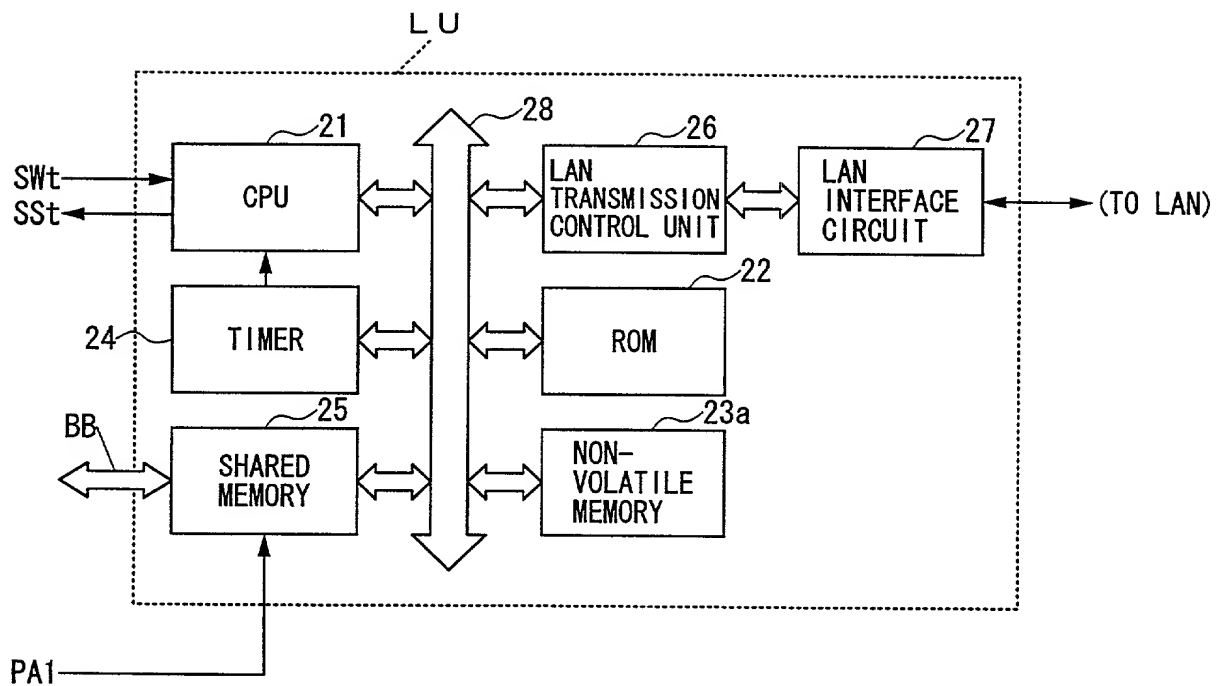


FIG. 20



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FIG. 21



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FIG. 22

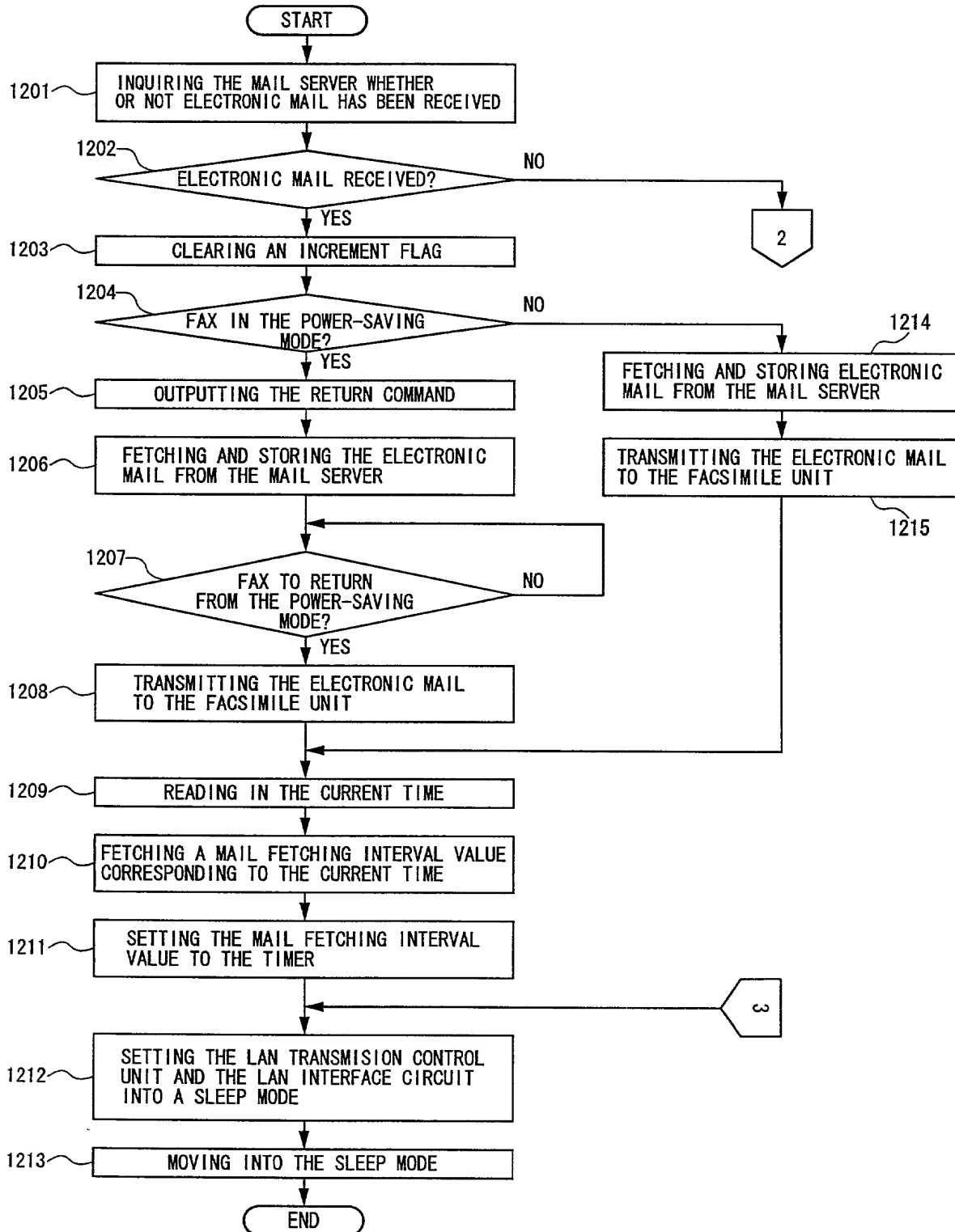


FIG. 24

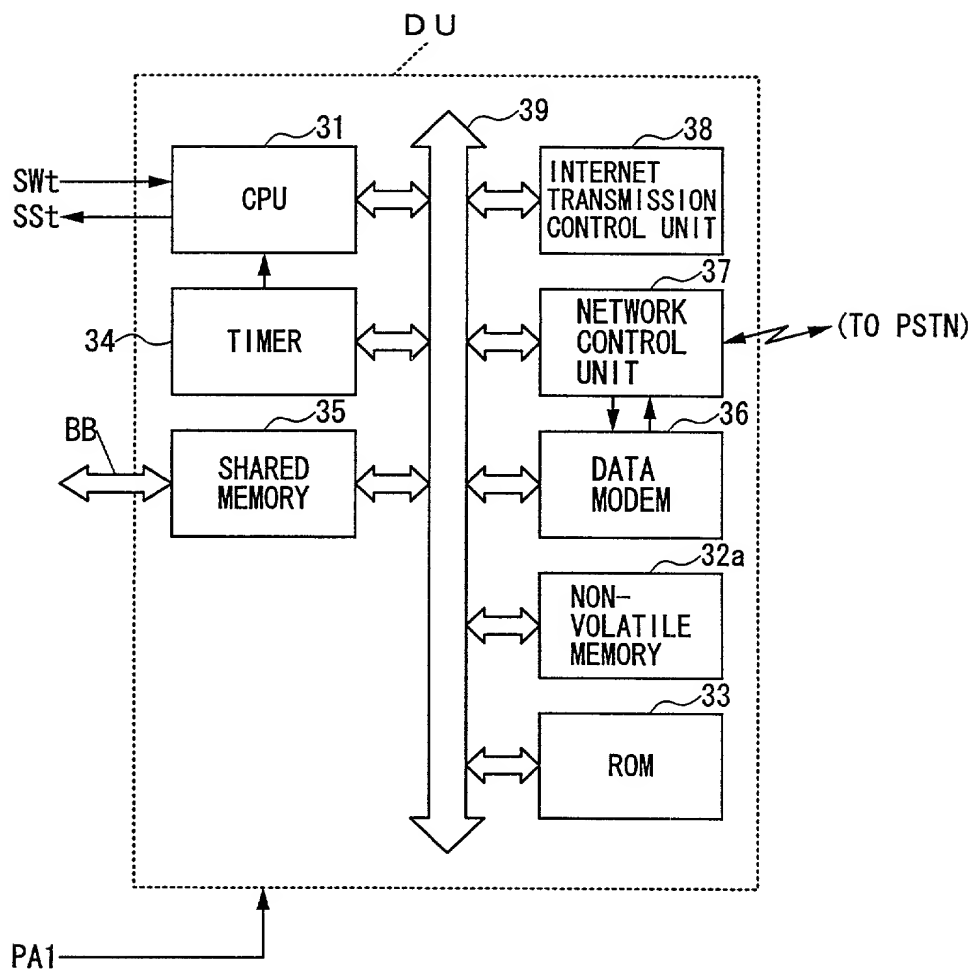


FIG. 25

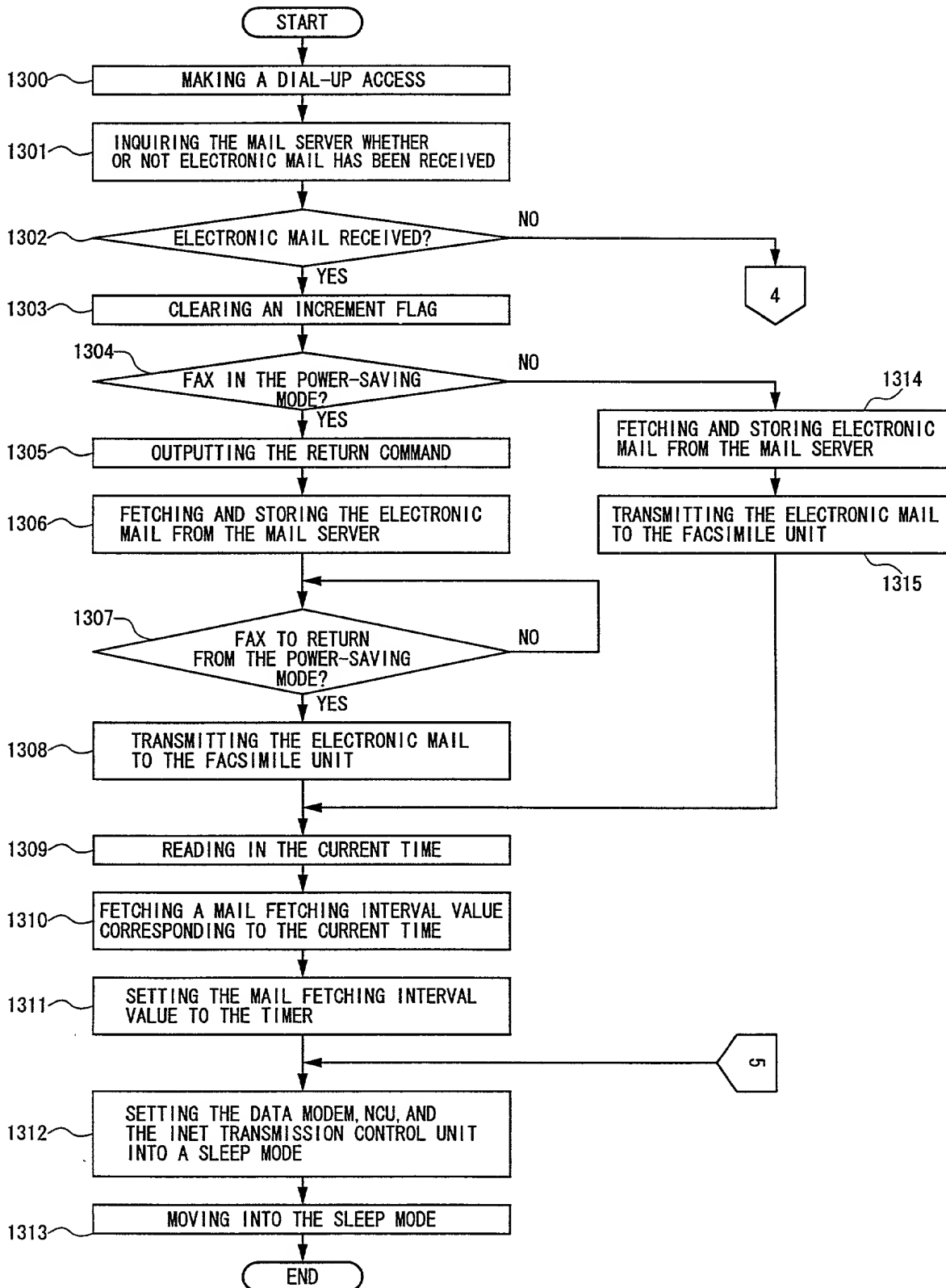


FIG. 26

